IN MEMORIAM.

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1887 - 1949.

WITH the death of Sir Alan Newton on 4th August, 1949, there passes from the scene the most colourful figure in the short history of this College. For many years his work and influence played a dominant part in our affairs. Soon after his resignation from the Council in 1947 he took, according to his convictions, little or no official part in College matters, but his influence lingers and will long continue to be felt.

The son of H. H. Newton, of Brighton, Victoria, he entered the University of Melbourne when only matriculation was required, and before the days of pre-requisites. He was educated at Haileybury College under Dr. Rendall, who taught him classics and English as a basis for his medical studies. To this early education Newton undoubtedly owed his ability in later life to speak so fluently and to write so lucidly. At the University he had the good fortune to be taught in his first year by Masson, Lyle, and Spencer, and later to study anatomy under Berry, who was appointed Professor of Anatomy in 1906. As a student and prosector with Berry, he wrote his first contribution to surgical literature on the superficial veins, which appeared in 1908 in the "Anatomischer Anzeiger." In 1909 he graduated with first class honours, obtaining first place in his year and the Exhibition in Surgery. A year was spent as a resident, and part of another as registrar, a position he resigned to become assistant to the late Mr. Fred Bird. Late in 1912 he went abroad, spending some time in England with Herz (later Sir Arthur Hurst) in

investigating the then comparatively new work on bowel movement as seen with X-ray after opaque meals. After this he was occupied in research work in Horsley's laboratory, and then went to America, where he worked with Cushing. On his return to Australia, Newton took his Mastership of Surgery at the Melbourne University, and was appointed to the Staff of the Melbourne Hospital late in 1913.

Mr. Bird went abroad on service in 1914, and Alan Newton carried on his work until 1916, when he, too, went abroad with the A.I.F. At the conclusion of his service he obtained the English Fellowship and returned to Australia late in 1919. In 1927 he became a Surgeon to In-Patients, but in 1940 obtained leave in order to take over the Chairmanship of the Medical Equipment Control Committee. The next five years, during which he carried out this arduous work while still doing a limited but strenuous surgical practice, undermined his health, and in 1946 he retired from practice. In 1936 he received the honour of Knighthood.

It thus came about that for the past ten years many of the younger men at the Royal Melbourne Hospital had not seen him at work, and, because of their absence on service, many of our younger Fellows had little contact with him.

Although he realised that he was not well enough to continue practising in 1946, he felt that he could help with under-graduate training, and accepted the Stewart Lectureship in Surgery, which, at present in the

University of Melbourne, is the nearest approach to a part-time professorship. About this time, too, he joined the Council of the University and was thus able to improve very much the co-ordination of the work at the three teaching hospitals where students pursue their clinical studies. The University Council was very sympathetic to his ideas and allotted some thousands of pounds annually to help carry them out.

By 1929 Alan Newton had established himself as one of the leading surgeons in Melbourne. He was appointed a member of the Council and Honorary Secretary of the Royal Australasian College of Surgeons. In 1933, following the death of Hamilton Russell, he was appointed Censor-in-Chief, and held this position until elected President in 1943. Over these years he brought to bear all his natural gifts, together with a ceaseless energy, so that he became, by virtue of his office, the guiding spirit of this College which attained a maturity and an importance few imagined possible. That he was helped most loyally by his fellow Councillors and by hundreds of Fellows in what he set out to achieve, none will doubt. That in the building of the structure we now regard as our College he often differed in viewpoint from many distinguished men, does not matter. Even those with whom he exchanged barbed words generously granted his transparent honesty, his complete lack of self-seeking and his breadth of vision.

In his five years work with the Medical Equipment Control Committee he lavished those same gifts on the vast problem of securing adequate material of every variety for the medical requirements of the three Services as well as for the civilian population. This work was done unobtrusively and in an honorary capacity. Few men could have accomplished it or brought to it the necessary vision and tact combined with relentless determination.

Newton had a great admiration for his forbears, a love of well conducted ceremonial and a splendid dignity of demeanour. He was convinced that to learn was not enough; it was necessary to teach and so to allow those who followed him to have the benefit of his knowledge and his experience. For this, generations of Australians will be under a debt of gratitude to him.

He had a restless energy which showed itself in all his activities, physical and mental. He was endowed with a brain which enabled him to eliminate the ornamentation and to concentrate on the important, and he used it without respite. His early education enabled him to write and speak with amazing clarity and economy of words. These gifts made him an excellent teacher, a splendid administrator and a powerful advocate.

He will long be remembered in Melbourne, both at his Hospital and at the University. The Founders gave him the opportunity of bestowing his gifts on this College, and it is probable that in his eighteen years of office he did more for it than any other individual. The universal recognition of this fact is the tribute the College pays to his memory.

ORBITAL TUMOURS.

By J. Bruce Hamilton.

Hobart.

Introduction.

NO body cavity has been so neglected as the orbit. This has arisen because of many problems associated with its anatomy and pathology, and especially because of the rarity and variety of its lesions.

The orbit, while pre-eminently the field of the ophthalmologist, is nevertheless the focal point for the rhinologist, the neuro-surgeon, the plastic and dental surgeon, and the general surgeon. Each has his own part to play in dealing with the pathology of the orbit, and none so much as the rhinologist. This can be seen by Table I, in which 18,957 Tasmanian ear, nose and throat cases ex-

TABLE 1.

Nose and Throat Cases with Orbital Complications from Parasinusitis

	Pansinusitis	Frontal Sinusitis	Ethmoiditis	Total Cases
Total case records	29	152	243	424
Orbital complications	2	10	3	15

N.B.—These figures are derived from examinations of 18,957 records of Ear, Nose and Throat cases.

TABLE 2.

Eye Cases with Orbital Complications from Parasinusitis

	Total Case Records	Pansinusitis	Frontal Sinusitis	Ethmoiditis	Total Cases
Hamilton ..	12,039	1	2	3	6
Phillips ..	9,089	1	—	—	1
Waterworth	1,129	—	1	—	1
Palfreyman	1,622	—	—	—	—
Total ..	23,879	2	3	3	8

hibited 15 examples of orbital complication, whereas in Table 2 will be seen 23,879 Tasmanian eye cases, where there were eight examples of orbital complication of accessory nasal sinusitis. On the other hand, these 23,879 eye cases only exhibited 11 orbital tumours. The orbit is the ideal site for surgical teamwork, but this has never been achieved so far.

Also the orbit is so filled with vital structures that a great many surgeons have avoided it with grim determination. One has only to turn the pages of the transparencies in Kronfeld's "The Human Eye" (1944) or of Wolff's "Anatomy of the Eye and Orbit" (1933) to realise how much damage can be done by the daring surgeon in so small a space. The optic nerve can be injured, and this may lead to field defects or blindness. The third nerve can be injured with resulting ptosis, anisocoria, or divergent strabismus. Injury to the fourth nerve may result in vertical strabismus. An injured ophthalmic branch of the fifth nerve may result in an anaesthetic cornea, lid and face, and possibly neuroparalytic keratitis, while a sixth nerve injury may cause internal strabismus. Each of these injuries produces a disfigurement or a discomfort which neither the surgeon nor the patient relishes. Of course, one must hasten to say that in many cases, and especially those of malignant tumour, damage to vital orbital structures is unavoidable and indeed very justified in an attempt to save an eye or even the life of the patient. Timid surgery of the orbit is worse than daring surgery.

For many years the ophthalmologist has, through the anterior approach and occasionally through the temporal approach known as "Kronlein's Operation," attempted the drainage of orbital cellulitis, the extirpation of non-malignant and malignant growths and the removal of orbital foreign bodies, but his successes have been intermittent and very discouraging at times. Although the paranasal sinuses from infancy to old age are one of the commonest causes of orbital pathology, the rhinologists have shown in the past a none too bold outlook when presented with a case of orbital cellulitis. This statement must be qualified by the fact that the patient often refers himself or is referred to the ophthalmologist first of all, and the rhinologist has an instinctive dislike of cases primarily ophthalmic in origin such as orbital cellulitis. But, of course, first the sulphonomides and then penicillin have robbed orbital cellulitis of much of the terror of its complications, such as cavernous sinus

thrombosis, and the rhinologist of some of his surgery. In considering infection of the accessory nasal sinuses, one must always keep in mind the wide variation of these air cells and especially abnormalities of the frontal sinuses which X-ray has revealed to be legion.

The general surgeon's interest in the orbit has been chiefly confined to neoplasms of the lids and fractures of the malar region. These neoplasms have frequently been allowed to extend into the orbit by the patient and finally may require exenteration of the whole orbital contents to effect a cure. The general surgeon's realm is chiefly that of the burrowing rodent ulcer, but his place of late in this realm has been somewhat usurped by the plastic surgeon. However, the neuro-surgeon is the person who, more than anyone else, has advanced the surgery of the orbit by expounding the wide possibilities of a transfrontal approach, not only for neoplasms and foreign bodies, but also for relief of intraorbital pressure in thyrotoxic exophthalmos. Perhaps the most complete work on the subject of orbital tumours is the volume by the late Walter Dandy (1942) of Johns Hopkins Hospital. In this monograph he has shown firstly that in selected cases, and in expert hands, the transfrontal approach has much to its credit. He further showed why the anterior and lateral approach has so often failed at the hands of the ophthalmologist because many orbital tumours choose the cranial cavity as their first line of spread, although orbital symptoms were the only ones present. This fact was pointed out by Hudson as long ago as 1912, when he wrote his monumental paper on optic nerve tumours. This paper of Hudson's, which surveyed the world literature at that time on this subject, was published in the Royal London Ophthalmic Hospital Report. To revert again to the 31 cases quoted by Dandy (1942), no less than 83 per cent. involved both the orbital and cranial cavity, in his series of cases.

As my paper is primarily for the ophthalmologist, I intend to look at the orbit from his viewpoint, but at the same time endeavour to present a wider view of the approach to orbital tumours.

DIAGNOSIS.

The obvious point, and one that need hardly be stressed to the Australian ophthal-mologist is the necessity of making an accurate diagnosis of the orbital condition presented by the patient. The ophthalmologist is confronted with certain signs and symptoms which need a wise and careful interpretation. If the case is one of injury, then the retention or otherwise of an orbital or intraocular foreign body, or a fracture of the orbital walls, can be more often than not confirmed by X-ray. The removal of a retained intra-orbital foreign body is usually not such a difficult task, but small non-magnetic foreign bodies in the apex of the orbit are, treated by present chemo-therapeutic agents, often best left in situ. For fracture of the orbit involving the face, both dental and plastic surgeons are needed in co-operation with the ophthalmic surgeon. But the relief of fractures of the superior orbital fissure or of the optic foramen do not appear to be warranted procedures (Stallard, 1946). Loss of sight in one eye following fracture of the optic foramen is seldom restored by decompression of the optic foramen, and it is felt that the crush fracture has produced nerve damage which decompression is unable to rectify. One cannot expect regeneration of an injured second cranial nerve.

But when the ophthalmologist is confronted with a unilateral or bilateral proptosis with other signs of orbital involvement, it is often extremely difficult to differentiate, especially when one is working in a goiterous or hydatid area (Soria, 1948) (Holland, 1948), such as Tasmania, between a tumour, a cyst, an inflammation or a thyrotoxic exophthalmos. The physician, the radiologist, the rhinologist and the biochemist are often needed in a team to arrive at a decision, but never should an attempt at diagnosis be made without the blood Wassermann reaction, the basal metabolic rate and the Casoni test being done. The surgical removal of a gumma has been undertaken in the series of cases later to be presented, and such a late diagnosis of syphilis may lead to unwarranted sequelae. The fact that one may be dealing with a chronic or acute paranasal sinusitis must ever be kept in mind, and I have reported eight cases of this disease from my own and my partners' case records. (Table 2.) These cases present to the oculist a problem in differential diagnosis.

The diagnosis of unilateral thyrotoxic exophthalmos can be a real problem for the

ophthalmologist, especially when the optic nerve becomes acutely swollen and shows haemorrhages. Four out of eight patients of Naffziger (1938) with thyrotoxic exophthalmos showed choked discs and were treated by decompression of the orbital roof and the optic foramen. Benedict (1948) says that despite a negative history of goitre, and despite a normal basal metabolic rate, unilateral exophthalmos may result from toxic goitre, and this is proved by microscopic examination of the extraocular muscles. Such a statement makes the ophthalmologist's diagnosis very difficult.

Having satisfied oneself that one is dealing with a tumour, then it is important to define whether this tumour is a primary or secondary. That is, there may be Hutchinson adrenal cortical tumour if the case is a child, or a carcinoma of the stomach, intestine, breast or prostate if the patient is an adult in middle life. A very careful case history is of paramount importance, and it is surprising the number of patients who endeavour to hide a past operation for malignancy or are ignorant of their original condition. In all suspected cases of malignancy the patient's general surgeon should be consulted. And then, having decided that the tumour is primary, one should endeavour to define its malignancy. Benedict (1948) considers biopsy of the orbit is bad practice. Perhaps I am being a little too elementary in my remarks, but it is surprising how confused is surgical thought on orbital pathology.

Another point which must be defined is this: Is there any tumour extension between the orbit and the cranial cavity? Remember that the fissures and foramen between the orbit and the middle cranial fossae form ideal exits and entrances for tumours. We must here again remember both Hudson's (1912) and Dandy's (1942) cases of cranial extension of orbital tumours. Therefore, has the tumour under review arisen in the o-bit and extended into the cranial cavity, or has the reverse occurred? Harvey Jackson (1945) considers that a fairly accurate diagnosis of this point can be made preoperatively, and I concur.

Occasionally, too, paranasal or lacrimal carcinoma invade the orbit especially through the thin medial orbital wall. Dickson Wright (1945) has pointed out the importance of one-sided nasal obstruction and epistaxis with exophthalmos and deafness on the same side. It is indicative of advanced primary carcinoma of the nasal sinuses invading the orbit. He concludes: "No surgery, possibly not even biopsy, should be attempted, as most encouraging results were obtained by thorough radiation of the whole area."

The diagnosis of operable tumour having been made, the chief interest now is how it should be approached. First the ophthalmic surgeon must ask is it necessary to interfere? He must, to arrive at an answer, ask himself similar questions to those asked by a general surgeon when approaching a tumour in other body sites. He must also keep in mind the extreme vulnerability of the orbital content and the necessity of complete corneal protection during and after the extirpation of the tumour. In 27 cases gleaned (and I say this advisedly) in Australia, only 14 were submitted to operation. Of my own nine cases, in only five was an operation performed. But having decided that operation is advisable, then four avenues are open to the surgeon. Firstly, the anterior route which is very suitable for dermoids and angiomata in the anterior third of the orbit, and also for lacrimal gland and sac tumours. Secondly, Kronlein's operation, which should be limited to those tumours situated in the lateral orbital content; thirdly, there is the transfrontal approach, which is the ideal for all tumours within the orbital muscle cone and especially for those tumours producing changes in the optic nerve and retina; and finally, the intranasal approach, which is best suited to those tumours which are limited to the medial third of the orbit and are obviously an extension from the paranasal sinuses.

There is some wisdom in Stallard's plea (1938, 1946 and 1948) for a lateral orbital approach to orbital tumours, and Guyton (1948) recommended lateral orbitotomy for decompression of thyrotoxic exophthalmos, but one must be realistic about the origin of the tumour. I took 12 cases of orbital tumours at random from the literature and found that four extended into the cranial cavity and that Kronlein's operation would never have given the desired exposure if attempted. Dandy's (1942) figure, quoted earlier, was very much higher.

And yet the scope of the ophthalmologist is far from limited, for of the 27 Australian cases of orbital tumours reported, only one was submitted to an intracranial operation out of the 12 operated upon. That is somewhat explained by the scarcity of neurosurgeons in Australia, but not entirely, for the one case occurred in Hobart and was referred to Melbourne for intracranial surgery.

I have said nothing about the approach to arterio-venous aneurysms and pulsating exophthalmos because I feel their approach is so indirect as to hardly fall within this category. But they must be diagnosed even more accurately than any of the foregoing, or the unsuspecting ophthalmic surgeon may locally approach one of these conditions with fatal result to his patient. It is the realm of the general surgeon to make a cervical approach to this problem.

100 ORBITAL TUMOURS.

Now let me review 100 cases of orbital tumours geographically detailed in Table 3. I will try to supply the answers to the following questions:—

    (a) The eye most commonly affected;
    (b) The sex most commonly affected;
    (c) The age incidence;
    (d) The first symptoms;
    (e) The favoured mode of treatment;
    (f) The histology;
    (g) The survival rate;
and (h) The resulting blindness rate.

So rare are orbital tumours that the Anti-cancer Council of Victoria, with the co-

TABLE 3.
Derivation of Cases

Tasmanian Cases	14
Australian Cases	13
European Cases	16
American Cases	57
Total Number of Cases	100

operation of Dr. Arthur Joyce of Melbourne, sent out a questionnaire to all ophthalmologists in Australia to obtain some idea of their incidence. For this I thank them sincerely, but the response was so poor at first that I have only been able to obtain records of 13 cases outside Hobart up till 27th May. The Hobart figure stands at 14, which gives us a total of 27 Australian cases

included to-day. No survey could be made from such meagre figures. I therefore turned to the literature and found in Dandy's (1942) monograph 31 cases of orbital tumours which addition was still inadequate for an analysis. So we gleaned another 42 cases from the literature, making a total of 100, and then proceeded to prepare this survey. Having indicated where these 100 cases came from, let me try to answer the above questions.

(a) *Eye most commonly affected.* Table 4 will give you the eye incidence of 100 unselected cases, and you will see that no less than 9 per cent. affected both eyes. This

TABLE 4.
Eye Incidence

	Aus. Cases	Cases from Literature		Total Cases
		Dandy	Other	
Right eye	7	18	14	39
Left eye	17	9	14	40
Both eyes	—	4	5	9
Unknown	3	—	9	12
Total	27	31	42	100

figure is possibly higher, as we could not ascertain in 12 cases which eye was affected, and further, all the bilateral cases were gleaned from the literature, and none occurred in the 27 Australian cases included in the 100 cases under review. So really nine out of 61 cases were bilateral, which is a 15 per cent. incidence. This should be noted later when dealing with the thyrotosicosis figures.

(b) *Sex most commonly affected.* Table 5 shows clearly how correct Hudson (1912) was when he said that optic nerve tumours are more frequent in the female. Yet in the 27 Australian cases, orbital tumours are more than twice as common in males than

TABLE 5.
Sex Incidence

	Aust. Cases	Cases from Literature		Total Cases
		Dandy	Other	
Males	19	9	17	45
Females	8	22	23	53
Unknown	—	—	2	2
Total	27	31	42	100

in females. In the European and American figures it is more than twice as common in the female than in the male. This is a global

distribution of sex incidence which should be followed up in neoplasms in other sites of the human body.

(c) *Age incidence.* Table 6 gives the age incidence, and it is remarkable to find such a high incidence of 27 per cent. in the first decade. These are mainly due to neuroblastoma of the Hutchinson type of the adrenal gland (Shaffer, 1947) and gliomatosis of the optic nerve in the non-Australian

TABLE 6.
Age Incidence

Decade	Aust. Cases	Cases from Literature		Total Cases
		Dandy	Other	
1–10	8	4	15	27
11–20 ..	4	3	3	10
21–30 ..	1	5	5	11
31–40 ..	1	5	4	10
41–50 ..	2	8	5	15
51–60 ..	5	5	3	13
61–70 ..	2	1	3	6
71–80 ..	3	0	0	3
Unknown ..	1	0	4	5
Total	27	31	42	100

cases, but dermoids and angiomata of the orbit account for most of the juvenile cases in Australia. After the tenth year there seems to be a steady age incidence till the end of the sixth decade, and after that the incidence decreases, which is unusual in tumour incidences in other parts of the body.

(d) *First symptoms.* When we turn to first symptoms in Table 7, we find that proptosis leads with 44 per cent. incidence, swelling of the lids follows at 23 per cent., and failure of vision at 18 per cent. Now if almost half of the 100 cases have proptosis, and if over 10 per cent. of these cases had bilateral tumours, it seems that not only the diagnosis of unilateral thyrotoxic exophthalmos from unilateral orbital tumours, but

TABLE 7.
First Symptoms

	Aust. Cases	Cases from Literature		Total Cases
		Dandy	Other	
Rash and Fever ..	—	—	1	1
Pain or Headache ..	—	1	3	4
Failing vision ..	4	8	6	18
Proptosis ..	8	15	21	44
Deformity of face ..	—	—	1	1
Swelling of lids, brow ..	13	4	6	23
Ecchymosis ..	—	—	1	1
Dark areas around eyes	—	—	1	1
Diplopia	2	1	1	4
Sub-conj. haemorrhage ..	—	—	1	1
Unknown	—	—	2	2
Total	27	31	42	100

TABLE 8.
Complications of Thyrotoxicosis

N.B.—These figures are derived from examinations of 23,879 case records. The following complications have occurred in 50 cases of thyrotoxicosis.

Retraction of lid :						
(a) Unilateral	..	..	..	..	16	
(b) Bilateral	..	..	..	..	17	
						33
Exophthalmos :						
(a) Unilateral	..	..	..	..	6	
(b) Bilateral	..	..	..	..	15	
						21
Anisocoria ..	..	..	..	..	..	20
Fundus Changes	..	..	..	..		
Muscle Paralysis	..	..	..	..		2
Convergence Insufficiencies	..	..	..			6

also the diagnosis of bilateral thyrotoxic exophthalmos from bilateral orbital tumours does present a difficult problem. The frequency of bilateral orbital tumours should here be stressed again. Let me now look at the analysis of 23,879 eye cases and the thyrotoxic incidence therein. We find the following figures as regards thyrotoxicosis displayed in Table 8. Although Tasmania is a highly goiterous country, there were only 50 cases of ocular signs of thyrotoxicosis in these series, which is a very low incidence. Of these 50 cases, only 15 cases, i.e., 30 per cent., had bilateral exophthalmos, 6 or 12 per cent. had unilateral exophthalmos, while 58 per cent. had no exophthalmos whatsoever. So that exophthalmos, whether it be bilateral or unilateral, does not in itself indicate either thyrotoxicosis or orbital tumour. Other signs of thyrotoxicosis were retracted lid, 66 per cent., and anisocoria, 40 per cent., so that, taken in conjunction with exophthalmos, these may be a guide to the diagnosis. Muscle paralysis stands at 4 per cent. both in orbital tumours and thyrotoxicosis.

(e) *Favoured mode of treatment.* Table 9 gives the treatment figures, and it is significant that outside Australia the transfrontal approach is widely practised. Out of the 73 non-Australian cases, no less than 39 were

TABLE 9.
Treatment

	Aust. Cases	Cases from Literature		Total Cases
		Dandy	Other	
Deep Therapy ..	6	1	7	14
Operation :				
Kronlein ..	2	—	2	4
Anterior Orbital	9	—	1	10
Transcranial ..	1	25	13	39
Unknown ..	2	5	9	16
No Treatment ..	7	—	10	17
Total	27	31	42	100

approached by this route, while in Australia only one of our 27 cases was dealt with in this way. It may be that we are a little out of step in Australia in our approach to the orbit, but of the 27 Australian cases, very few from their histology (Table 10) would have required such an approach. Deep therapy seems to have been practised more in Australia than in Europe and America, but its indication in orbital tumours must be limited and should be very guarded in its application.

(f) *Histology.* Table 10 gives the histology of the 100 cases analysed, and it will be seen what a wide variety of tumours we have had before us. This table has been simplified as much as possible—perhaps too much so— but it will give a fairly accurate guide to the etiology of tumours of the orbit. It

TABLE 10.
Histology

	Aust. Cases	Cases from Literature		Total Cases
		Dandy	Other	
Benign giant cell tumour of the Brain	1	—	—	1
Carcinoma	1	1	1	3
Chloroma	—	—	1	1
Dermoids and Teratomata	5	—	3	8
Fibroblastic tumours (inc. Meningioma, endothelioma)	2	12	6	20
Fibromata (inc. neurofibroma and myxofibroma)	2	1	2	5
Gliomata (inc. astrocytoma)	—	4	2	6
Gumma	2	—	—	2
Haemangiomata ..	4	—	2	6
Hydatid	—	—	1	1
Lymphangiomata ..	1	—	1	2
Melanomata	—	—	2	2
Metastatic Carcinoma .	1	—	1	2
Mickulicz's Disease ..	1	—	—	1
Mucocele of frontal sinus	1	—	—	1
Myxoma	—	—	2	2
Neurinomata	—	—	2	2
Neuroblastoma of the Adrenal Gland ..	—	—	7	7
Osteoma and Exostosis	2	3	4	9
Pseudo-tumour	—	1	—	1
Rodent ulcer	1	—	—	1
Sarcomata (various cell types)	1	4	2	7
Schuller-Christian's Disease	—	5	1	6
Tumour of Orbit (Histology not stated) ..	2	—	2	4
Total	27	31	42	100

shows the wide range of malignant and non-malignant neoplasms that arise therein, and further it shows that outside the 20 fibroblastic tumours (meningiomata and endotheliomata) none of the other types reach a 10 per cent. incidence. It is surprising that in a country with such a high incidence of hydatid, not one hydatid of the orbit occurred

in the 27 Australian cases, although many have been reported recently in England (Holland, 1948) and in Spain (Soria, 1948).

(g) *Survival rate.* The survival rate of these tumours we have tried to estimate, but without any success. In 1948 I analysed 11 cases of sarcoma of the choroid, followed up for ten years or longer in Tasmania, and was able to say that there was only a mortality rate of 36.3 per cent., but neither from the 14 orbital tumour cases in Tasmania, nor from the 13 other Australian cases, am I able to give any indication as to their survival rate. Nor am I able to define a survival rate in the 73 cases gleaned from the literature. You have already observed in Table 10 the variety of histologies which were presented, so I feel a survival rate estimation would not be of any great practical help. Posner-Horrax (1948) reported three cases of intracranial extension of optic nerve tumours, two being astrocytomata and one a fibromatosis of the optic nerve. Their survival rate following removal was from 4½ to 12 years. Hudson in his survey in 1912 was of the opinion that, despite inadequate removal, the survival rate of both gliomatosis and endothelioma of the optic nerve was surprising.

(h) *Resulting blindness rate.* The blindness rate of these 100 orbital tumour cases is interesting. Table 11 shows the monocular blindness rate at 24 per cent. and the binocular blindness rate at 3 per cent. As indicated in my opening remarks, such a

TABLE 11.
Ocular Defects resulting from Orbital Tumours

	Aust. Cases	Cases from Literature		Total Cases
		Dandy	Other	
Total number of cases ..	27	31	42	100
Loss of Monocular Vision :	5	9	10	24
(a) Due to loss of eye	2	—	4	6
(b) Not due to loss of eye	3	9	6	18
Loss of Binocular Vision :	—	2	1	3
(a) Due to loss of eyes	—	—	—	—
(b) Not due to loss of eyes	—	2	1	3

blindness rate is only to be expected when one is dealing with so many cranial nerves in so small a space as the orbit, where radical surgery is often life-saving. Nevertheless the blindness rate is dropping throughout the world, and I hope to show in a subsequent

paper that Tasmanian monocular and bino-
cular blindness has dropped to half in the
last ten years.

SUMMARY AND CONCLUSIONS.

(1) 100 orbital tumours, 27 of which are
Australian cases, have been surveyed.

(2) The surgical approach to such tumours
has been indicated in tabular form and
the geographical variation in treatment
indicated.

(3) The sex and age incidence has been
discussed and the high percentage of
orbital tumours in the first decade of
life stressed.

(4) The histology of these 100 cases has
been tabulated and the great variety of
tumours indicated.

(5) The blindness rate has been analysed,
and it appears very satisfactory.

(6) A plea for a survey of survival rates of
all types of orbital tumours is enjoined,
but it appears, except in the case of
secondary malignancies, that it is good.

(7) The rarity of orbital tumours leaves the
average ophthalmologist unaccustomed
to their treatment and the assistance of
the general, nasal, dental or neuro-
surgeon should be co-opted whenever
advisable.

ACKNOWLEDGMENTS.

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THE LATERAL LYMPHO-EPITHELIAL CYST OF THE NECK.

("BRANCHIAL" CYST)

By E. S. J. KING.

Melbourne.

"To my great satisfaction, the term took; and when the 'Spectator' had stood godfather to it, any suspicion in the minds of respectable people that a knowledge of its parentage might have awakened was, of course, completely lulled."

—(Thomas Henry Huxley, Christianity and Agnosticism: A Controversy.)

CYSTS of the neck occur in various parts of the region, but the best known and most common fall into two topographical groups—the medial group lying in or near the midline and the lateral group which is usually found under the anterior border of the sternocleidomastoid muscle. One form, which frequently occupies a position near the bifurcation of the carotid arteries and histologically shows an epithelial lining with immediately subjacent lymphoid tissue, has been designated the "branchial" cyst.

This cyst is referred to here as the Lateral Lympho-epithelial Cyst, a name chosen because of the characteristic histological appearances, and therefore one preferable to any depending on some doubtful origin. A few midline cysts have a similar structure but the term "lateral" differentiates the present group from them.

The nature of these cysts has been the subject of disputes since their clear description nearly a hundred years ago. Indeed, most of the literature relating to them deals with argument over the relative merits of hypotheses and, curiously enough, even in recent papers, ignores observations or contains erroneous statements of the features of the cysts. A short review of the question therefore seems desirable.

This paper embodies observations made on seventy-six cases of "branchial" cysts observed over a period of twenty years.

HISTORICAL.

A study of the way in which our present point of view has been arrived at is valuable, if not essential, with all conditions, but it is particularly instructive in the case of these cysts. Two features become apparent immediately.

First, the most definite and firmly entrenched of our ideas are seen to have arisen

FIGURE I. Photograph of the neck of a female aged 18 years, showing a typical cyst lying just superficial to the bifurcation of the carotid arteries.

originally as more or less inspired guesses, and, because they have been passed on from generation to generation, their dubious origin is overlooked. Observations, in these circumstances, become of secondary importance, and certainly any which do not conform with the hypotheses of the moment are tactfully ignored. The occasional truth seeker is liable to attack from all sides.

Secondly, pathological and surgical opinions depend on embryological and anatomical observations and deductions made from these. Such opinion becomes incorporated in current teaching, and indeed becomes a fixed pillar in the surgical edifice. However, em-

bryological investigations proceed and, within a short time, new information arises which makes the older hypotheses untenable. In the case of the "branchial" cysts, we have an excellent example of this common but deplorable state of affairs of the pathological hypotheses of any period being based on the embryological views of earlier decades. Thus forty years ago the views on "branchial" cysts were based on hypothesis half a century old. In not one recent paper dealing with these cysts is there even mention of the remarkable embryological advances of the last half-century.

FIGURE II. Photograph of a cyst, showing the smooth lining with some trabeculation of the wall (from a female patient aged 52 years). Natural size.

The cysts of the neck are closely bound up with the cervical fistulae, and must be considered with them. Examples were described in 1789 by Hensezowski, and in 1820 by Dzondi, but it was the description of branchial arches in the pig by Rathke in 1825, and in the human embryo by von Baer in 1827, that enabled Ascherson (1832) to associate cervical fistulae with the arches and clefts. These conclusions were important, since they led to similar assumptions regarding cysts. It should be noted that His decried these unsupported speculations, and pointed out that fistulae could not occur—that the observations were poor, and the fistulae were made by a probe. This warning about the necessity for careful observation has not been heeded.

The relationship between branchial clefts and fistulae and cysts was emphasised by a series of investigators, amongst whom were Heusinger (1854), Langenbeck (1855), Cusset (1877), Kostaniecki and Mielecki (1890) and Bland-Sutton (1922). Although none of these added any real evidence, the weight of reiterated authoritative statement not only controlled and limited all contemporary investigations, but also moulds present-day opinion.

In 1912, Wenglowski re-examined the question by way of dissection of the neck of numerous foetuses and adults. He concluded that the branchial clefts are not represented in any adult tissues below the level of the hyoid bone, and that therefore "branchial" cysts which lie below this structure cannot be derived from the branchial clefts. Being impressed with the necessity for deriving the cysts from some early embryonic structure, he postulated that they arose from the thymic duct (an outgrowth from pharyngeal pouches). One possible justification for such a suggestion is that the walls of some cysts contain thymic tissue. The importance of this work is that it showed the fallacies inherent in the currently accepted hypotheses.

The adherents of the older view now changed their ground, and derived the cysts from the precervical sinus. This hypothesis, because it embraced a wider area of tissue, was not subject to so many difficulties, either of position of cysts or their relationship to vessels and nerves. Frazer (1923, 1926) presented the problems from the viewpoint of the morphological embryologist, and stated catergorically that the term "branchial" should no longer be applied to the cysts.
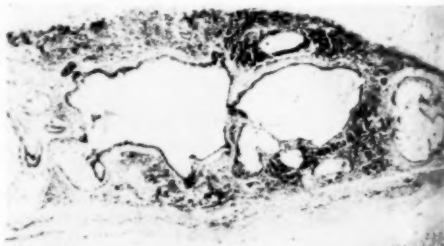

FIGURE III. Photomicrograph of a multilocular cyst removed from the lower pole of the parotid gland. x 18.

In recent years the subject has been discussed by relatively few writers, and these would seem, without any serious consideration of observations, to have reverted to the older views. Bailey (1923, 1933) refused to accept Wenglowski's hypothesis because, amongst other arguments, pieces of cartilage which are of branchial origin (sic) are to

be found in the lower part of the neck. Malcolm and Benson (1940) discarded it because thymic tissue is rarely found in cysts! Such flagrant disregard for the laws of logic on the one hand, and carefree neglect of demonstrable phenomena on the other, are all too common in the literature dealing with this subject, and indeed are the stuff of which the "congenital" hypotheses are made. It is not proposed here to defend Wenglowski's hypothesis but to indicate that, of the "congenital" hypotheses, it has most justification.

It is clear that much of our information is hypothesis, and that a generous leavening of evidence is desirable, and that this should extend beyond the few data that have been collected and frequently quoted. Observations made on a series of seventy-six cysts (taken from a larger group) are described here. The examples excluded were discarded solely because some important feature of the history or operative findings was not available.

RESULTS OF EXAMINATION OF PATHOLOGICAL MATERIAL.

The cysts described here show a considerable range of variation in both position and structure, so that some definite criterion of which are to be included in the group must be recognised. The criterion proposed, since it is a constant feature and indeed provides the basis for diagnosis, is that of the histological structure of the wall. An epithelial lining with subjacent lymphoid

FIGURE IV. Photomicrograph of portion of the wall of a typical cervical cyst showing squamous stratified epithelium with subjacent lymphoid stroma. x 80.

tissue is invariable in some or other part (if not the whole) of the cyst wall. Observations of two kinds are considered: (A) those dealing with cysts and (B) those dealing with phenomena not observed in the cysts, but having some bearing on them or their formation.

1. *Site of cysts.*

(a) The cyst commonly lies under the anterior border of the sternocleidomastoid muscle at the level of the bifurcation of the carotid arteries. It may project for some distance between these vessels. This observation has been given great prominence, but with it must be considered other features:

(i) The majority, though lying in this general region, do not project between the vessels, but lie superficial to them.

(ii) Other swellings, *e.g.*, tuberculous lymph nodes, may project between the arteries toward the pharynx.

(iii) Some cysts, particularly small examples, may be indistinguishable from an enlarged lymph node, suggesting that any relationship to the vessels is secondary.

(b) Some cysts are found superficial to the vessels, but not necessarily close to the bifurcation.

(c) Examples occur higher in the neck, often associated with the salivary glands, either attached to them or incorporated in their structure (Figure XV).

(d) Cysts are found occasionally deep in the neck close to the pharyngeal wall.

(e) Midline cysts, though usually having a different structure, sometimes are indistinguishable from the laterally-placed types.

(f) Occasionally cysts of this type are found in the thyroid and thymic glands. The writer has observed only one example of this kind in thyroid gland, but thymic cysts are not uncommon.

Midline cysts and those of the thyroid and thymus glands are not included in the present category only for topographical reasons, but are mentioned because they form part of a series to the whole of which any hypothesis of origin should be applicable.

The cysts occupy a wide area extending from the face over the anterior part of the neck, and even into the anterior mediastinum. They are found most commonly near the carotid bifurcation, but it is most important that outlying examples should not be ignored.

SITE OF CYSTS.

Superficial to carotid bifurcation	42 cases
Between vessels	14 cases
Superficial to vessels but not at bifurcation	12 cases
Pharyngeal	2 cases
Related to salivary glands	6 cases
Total	76 cases

Table I. The majority of the cysts was found in the typical position, but only a few of these projected between the vessels.

2. General features.

The cysts range from small, firm, even tense, unilocular structures, to larger cysts which may be lax (*i.e.*, having a low intra-cystic tension), and they may be multilocular (Figure III). The small cysts are diagnosed frequently as enlarged lymph nodes.

AGE AND SEX.

	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	Total
Male	1	6	18	5	5	5	1	—	41
Female	2	8	16	4	2	1	1	1	35
Total	3	14	34	9	7	6	2	1	76

Table II. The number of cases in each decade is shown. The peak incidence in the third decade is well demonstrated.

The thickness of the wall varies considerably, and this, in part, determines the consistence of the structure. The internal lining may be smooth, but it is often irregularly mammillated. The internal aspect often shows some trabeculation. The contents range from a clear fluid containing some cholesterol crystals (rarely mucinous) to a pultaceous semi-solid material.

STRUCTURE OF CYST WALL.

	Lymphoid	Thymus	Total
Unilocular	61	4	65
Multilocular	7	4	11
Total	68	8	76

Table III. Of the multilocular group with a lymphoid stromal wall, four (4) were in relationship to salivary glands.

The multilocular cysts are composed of loculi which vary greatly in size, ranging from minute ones, only obvious microscopic-ally, to those several centimetres in diameter. There were eleven examples amongst the seventy-six cases examined. These cysts are not significantly different in either site or external appearance from the unilocular forms.
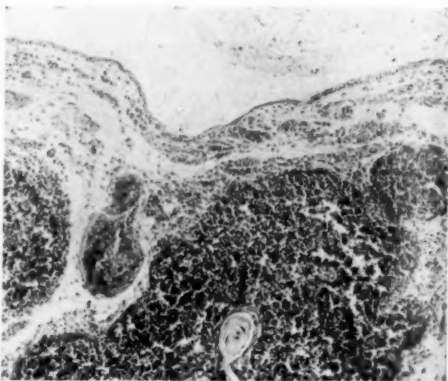

FIGURE V. Photomicrograph of wall of a cyst in which the stroma is thymus. A Hassall's corpuscle is apparent in the middle of the lower part of the illustration. x 75.

3. Histological examination.

Microscopically, the cysts are lined by an epithelium which is usually squamous in type. Immediately beneath this is lymphoid tissue (Figure IV).

The thickness of the epithelium varies in different parts of the cyst, and may be of a simple type only one cell thick. This merges into a stratified form of a few or many layers of cells. Often this stratified epithelium resembles that seen in mucous membranes, but it may show definite keratinization. This squamous epithelium often lines the whole of the cyst wall.

Columnar cells are found lining cysts only rarely, and then usually in the deeper ones. These cells may constitute the whole epithelium, when the contents are usually mucinous, but they may be associated with squamous epithelium.

The epithelium is related closely to the underlying lymphoid tissue, and though in some circumstances there is a thin layer of connective tissue between them, often it is not possible, with any certainty, to separate the epithelial from the lymphoid cells. In places, strands or crypts of epithelial cells

penetrate into the lymphoid tissue, and appear to merge with it (Figure XI).

This underlying "lymphoid" stroma is found sometimes to be morphologically thymus (Figure V). This was so in eight of the seventy-six cases observed. This tissue contains Hassall's corpuscles in various stages of development, and many of them show cystic change. All gradations can be found between corpuscles and large loculi. Of the eight cysts with thymic tissue, four were multilocular.
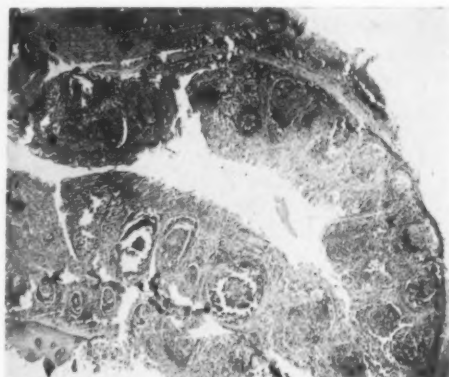

FIGURE VI. Photomicrograph of a lymph node, showing a slit-like space lined by a developing epithelium (Cf. Figures VII and VIII). This was associated with a typical cyst. x 15.

4. Relationship to lymph nodes.

That there is a close relationship between the cysts and lymph nodes is shown in several ways:—

(i) Frequently a small nodule of tissue, which shows all the features of a lymph node, is found adherent to some part of the cyst wall. Such nodules are usually single, but may be multiple, and though usually completely surrounded by a fibrous capsule they may merge into the lymphoid tissue of the wall.

(ii) In some cysts the lymphoid tissue is thick, particularly in one part of the wall, and many lymph follicles are present. This tissue differs from the lymph nodes only in its different topography—it is extended over an area instead of being contained within a sharply circumscribed area.

(iii) A small cyst may present as a typical enlarged lymph node (Figure IX). On in-

cision, the cavity is small (even slit-like) with a thick lymphoid wall. All gradations are found between these and lymph nodes containing epithelium (see below) on the one hand and larger cysts on the other.

(iv) Lymph nodes adjacent to a cyst may show some well developed epithelium of squamous type (Figures VI, VII and VIII).

(v) The general distribution of the cysts corresponds more closely with the distribution of lymph nodes than any other one feature (say, the track of the thymic duct).

This relationship of the cysts to lymph nodes and to lymphoid tissue is of fundamental importance. It is demonstrated readily, but appears to have been noted only incidentally by a few observers.

FIGURE VII. Photomicrograph of portion of the wall of the space in the lymph node shown in Figure VI. The lining cells are partly cuboidal or flat, and in part are simple squamous in type. x 90.

5. Relationship to vessels and nerves.

Apart from the occasional protrusion of the deep part of a cyst between the two carotid arteries—a feature common to other conditions—the cysts do not present any constant or even frequent associations with vessels or nerves. Statements commonly made about them were the result of ad hoc "observations." An inability to confirm such "observations" needs emphasis since the

statements are repeated with such gravity and assurance as usually to nonpluss any criticism of them.

6. *Relationship to sinuses.*

The sinuses which attract most attention are those found at birth. Actually these are much less common than those developing after birth. The more common type is not seen often, but is exemplified by the following history:—

Male, aet. 19 years, developed a swelling in the neck at the age of fifteen years, and about the same time a discharging sinus appeared. After a time, the discharge ceased, and the sinus was thought to have healed. It re-opened with the discharge of mucopurulent material on several occasions. A diagnosis of tuberculous lymph node was made, and the sinus and "lymph node" were excised from the region of the carotid bifurcation. Histological examination of the nodule at the deep end of the sinus showed no evidence of active inflammatory disease (acute or chronic), but a cystic lymph node with a squamous epithelial lining was found (Figure IX).

Most of the examples occurring in young children appear after birth also. The sinus may appear even within a few days of birth, and such cases form a connecting link between the obviously adult forms and those of antenatal origin. The sinuses in both young and older individuals open on to the exterior at the anterior border of the sterno-cleidomastoid muscle, sometimes low down towards its sternal origin.
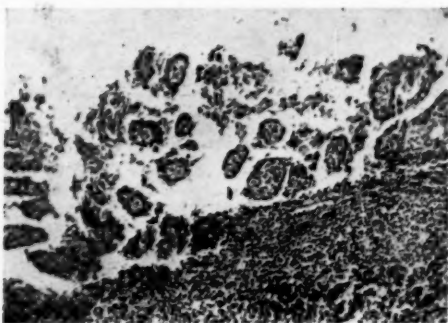

FIGURE VIII. Photomicrograph of portion of the wall of the cavity in the lymph node shown in Figure VI. The covering of the wall and the papillary projections ranges from flattened to cuboidal epithelium. x 70.

The above observations are only some of those that may be made on the cysts, since any exhaustive statement would re-quire greater space than is available here. These, however, provide sufficient basis for the present discussion.

The second group of observations is to be made on neck structures, either in the presence or absence of cysts.

1. *Presence of epithelium in lymph nodes.*

Epithelia of various types have been found in lymph nodes of the neck and the retro-peritoneal tissues by various observers. The writer has found epithelium in cervical lymph nodes on twelve occasions (where there was no question, either before the discovery or in the subsequent history, of metastatic growth). In seven cases there was an adjacent cyst, but in the other five no such cyst was present. Salivary inclusions and aberrant thyroid tissue are not included amongst these cases, *i.e.*, the epithelium was not morphologically of salivary duct type nor was it papillary. In one case the epithelium was single layered and was flattened in form but in the remainder it was squamoid (Figures XI and XII). In most of the cases there were gradations between a flattened pauci-layered epithelium and a typical stratified squamous form.

In the best developed examples distension of the sinusoids had occurred with formation of a small cavity and epithelium was present on the walls of this.

2. *Primary squamous cell tumours of lymph nodes:*

These tumours have been designated branchogenic carcinomata. At the beginning of this century re-examination of the group led to the conclusion that most, if not all, of them were secondary to tumours of pharynx or tonsil. However, some of these growths are primary. One example observed by the writer was found in a male aged 33 years, in whom not only was no primary growth found either before or after the diagnosis was made (or even at his death two years later); but the tumour showed histological differences from secondary neoplasms. These differences included the topographical site of squamoid cells in the early stages (in the middle rather than in the peripheral sinus of the node), cytological peculiarities of the cells and associated hyperplasia of the lymphoid tissue. The

FIGURE IX. Photomicrograph of portion of the "cyst" at the deep end of a cervical sinus. The space appears to be derived from dilated and confluent sinusoids. There is considerable fibrosis. x 20.

occurrence of these tumours is significant, particularly when considered in conjunction with the occasional presence of epithelium, as indicating the origination of epithelium in this area.

3. *Relationship of epithelium to lymphoid tissue.*

The general relationship of epithelium to lymphoid tissue in a zone including the anterior area of the neck and the mediastinum is well shown, in normal circumstances, in the tonsil, adjacent parts of the pharynx and oesophagus, the thymus and sometimes in the thyroid gland. In pathological conditions it is seen in some tumours, especially the lymphoepithelioma and the adenolymphoma of the salivary glands. The same kind of relationship is obvious in the epithelial developments in lymph nodes mentioned above. It is, of course, an essential feature of the cysts described here.

This kind of tissue association is commonly seen both in the embryo and in the adult organism. It is shown usually as an epithelium - connective tissue relationship, *e.g.,* ducts and periductal tissue in the breast, epithelium and stroma in the uterus, and

many others equally important even if less commonly observed.

The inter-relationship of the tissues is shown in another way. As stated above, the epithelium is segregated sometimes from the lymphoid tissue by a thin band of fibrous tissue, but often they merge, and it
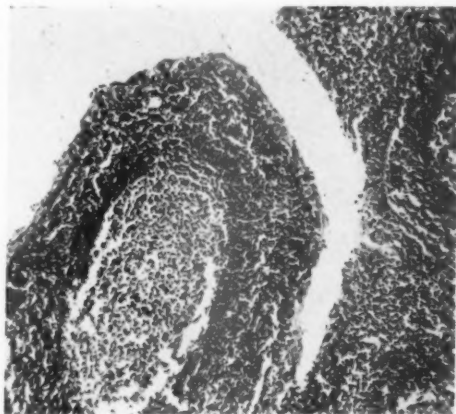

FIGURE X. Photomicrograph of portion of the cyst wall shown in Figure IX. The lining cells range from simple to stratified squamous epithelium. Their demarcation from the underlying tissue is not sharp. x 80.

may be impossible to separate the two tissues with any certainty (Figure XIV). Where epithelium ends and "lymphoid" cells begin cannot be determined on morphological grounds. In this regard it is noteworthy that there have been disputes for many years as to the nature of the stroma of the thymus. It is not proposed to argue this matter here, but to indicate that there is a close relationship between the two tissues.

These observations all have a bearing on the mode of formation of the cysts, but they will be considered first particularly in so far as they affect the hypotheses which have been proposed to account for them.

REVIEW OF THE CURRENT HYPOTHESES.

The principal hypotheses of origin of these cysts are that they arise from remnants of a branchial cleft, of the precervical sinus and the thymic duct. Before considering these in detail, certain general propositions should be discussed.

FIGURE XI. Photomicrograph of portion of a lymph node, showing a band of stratified squamous epithelium (showing part of a slit in one place). This was found in a male (aet. 18 years) adjacent to but not contiguous with a large cyst. x 90.

First, it is necessary to be quite clear as to what is meant when an adult structure is said to be derived from some special embryonic structure. Of course all adult organs or tissues must be traceable in some manner to the ovum, and therefore to certain intermediate organs. However, for such derivations to be significant, some kind of continuous relationship between the embryonic tissue and the adult structure must be demonstrated. Unless the relationship is reasonably direct and demonstrable, the specific idea is not only useless but, because it provides a spurious profundity, actually is harmful and hinders further study. It should be emphasised that vague circumstantial evidence or general comparisons of embryonic organs with adult tissues are not enough, but intermediate stages must be demonstrated. Nevertheless, attempts to provide such evidence are not made. Thus if this kind of relationship cannot be shown, then the hypothesis cannot be stated in this form.

Secondly, cognisance must be taken of the long interval between the time of formation of the (presumed) originating organs and the time of discovery of the condition. The branchial clefts and the thymic duct are found only in the early stages of embryonic development. The extremely labile and plastic nature of the tissues and the extraordinarily gross changes which occur in it during development are usually overlooked. That any one structure (or even a part of it) should remain in anything approaching its embryonic form while all the surrounding tissues are undergoing metamorphosis requires some special explanation, which, however, is never put forward. The problem is emphasised by the clinical observation of discovery of a cyst as a demonstrable lesion only after several years of post-natal life—even in the eighth decade. Thus this intrinsic unlikelihood of tissues remaining as remnants makes it incumbent on supporters of such an hypothesis to produce strong evidence in its favour.

Thirdly, observations made in the adult must be specially precise and consistent. Since, in the absence of other evidence, a few anatomical relationships come to have a great significance (indeed on them the hypotheses are based), these must be demon-

strated with certainty. In actual fact precise observations are not easy to make at operation, but in any case they are not constant.

Fourthly, the hypotheses must be tested even more thoroughly than usual, since there is such little evidence available. It has been the habit to ignore cases which, because of position or structure, did not conform with current views, but it is essential that all such should be considered specially.

The hypotheses will now be considered separately.

Branchial Hypothesis.

This, the patriarch of the hypotheses, has given its patronymic to these cysts for a century. It has depended on the site of the cysts and the presence of sinuses and "fistulae." These were correlated with branchial clefts and arches, morphological features of the embryo in the first month of embryonic life. The wide gap (in time) between the two has not discouraged proponents of the hypothesis. A less important point has been that the squamous epithelial lining of the cysts indicates an origin from the surface of the organism—in this case from the clefts. When the clefts closed some remnant of epithelium remained. These superficial arguments can be dealt with in various ways.

Morphological embryology shows that the clefts disappear at a very early stage and have no more significance than the pronephros. The tissues to which the arches give rise are incorporated high in the neck, and thus, even if we accept the proposition that remnants could be left behind, cysts would develop above and not below the hyoid bone. It is significant that investigators who have specially studied this question (Wenglowski, 1912; Frazer, 1923) have been quite clear on this point, whereas opposing views have been of the armchair type.

The conclusions drawn from the presence of "fistulae" have depended on minutiae of vessel and nerve relationships, but have ignored the presence of the membrane between cleft and pharyngeal pouch. Indeed, the frequent use of the term "fistula" focusses attention on the so common

absence of critical assessment of these conditions.

For a fistula to have developed there must have been some destructive lesion; but the nature of this has never become an integral part of the hypothesis. Even when we speak of sinuses, a "failure of development" does nothing to help us to understand the condition. The formation of sinuses after birth, however, indicates some understandable (probably inflammatory) process and, as stated earlier, their appearance in young children suggests a relationship between those in adult life and the ones which are present at birth. The mode of development of congenital sinuses and "fistulae" has never been explored adequately, and certainly any speculative origin should not be used to bolster hypotheses regarding cysts.

The position of the cysts (and sinuses) between the two carotid arteries has always been one of the main buttresses of the bran-
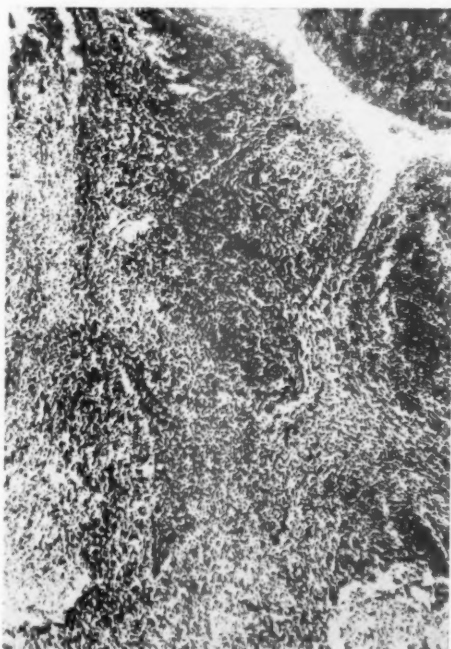

FIGURE XII. Photomicrograph of portion of a lymph node in which there were some distended sinusoids. Strands of squamous epithelium are to be seen traversing the left side of the photograph. This node was not associated with a cyst. x 90.

chial idea; but, as stated above, it collapses when the necessary nerve relationships are scrutinised. This question has been reviewed by Meyer and need not detain us here. In addition, structures which are not "branchial" occupy this site. Furthermore, many cysts do not lie anywhere near this area.

The cyst lining is commonly squamous epithelium and rarely columnar epithelium. That squamous epithelium must arise from the exterior, usually skin, is a common notion. However, it is almost ubiquitous, being observed to arise in bronchi, stomach, gall bladder and renal tract commonly, and less often even in the spleen and the serous membranes. The squamous nature of the epithelium therefore has little if any bearing on the origin of the cysts.

Columnar epithelium, when present, has been hailed as the representative of the pharyngeal pouch. But the pharynx is lined by squamous epithelium, the nearest surface epithelium of this type being in the bronchi or stomach. Mucous glands are, of course, present in the pharynx, but the point is made here to emphasise how superficial the arguments are. Where columnar cells and squamous epithelium occur together again there must be some explanation for the contiguity of cleft and pouch. It is not proposed to discuss details of early embryological development here, but one observation, that the clefts and pouches do not lie opposite each other, indicates the difficulties surrounding these apparently simple explanations.

Thus, even with an inflexibly morphological approach to the branchial hypothesis, it is apparent that it is thoroughly unsatisfactory. It has been discarded by many writers now for three decades, but despite the absence of any fresh evidence, it reappears from time to time probably because the cysts have been named "branchial."

There are several other features which are never considered by the branchial cyst protagonists: the relatively wide distribution of the cysts (e.g., in the salivary glands), the occurrence of thymic tissue in the walls of some, and even the constant presence of lymphoid tissue is passed without remark. None of these can be satisfactorily incor-

porated in or explained by what is a shallow and superficial conception.

"Precervical Sinus" Hypothesis.

This notion was brought forward because of difficulties in reconciling observations with the "branchial" hypothesis, and it is an offshoot of it. The only difference is that the unobliterated space or the sequestered epithelium comes from this more extensive area rather than the more locally circumscribed clefts. The same difficulties discussed above apply here. "Failure of closure" of an embryonic cleft or tube is, in itself, meaningless. "The sinus does not close in the sense usually understood" (Frazer, 1926), and tissues related to it lie subsequently high in the neck.

The site of the external opening of the sinuses along the anterior border of the sternocleidomastoid muscle can be correlated with a line of closure of the precervical sinus only by unsupported speculation. Investigations on the morphology of this area in young embryos indicate that even if there were a line of closure it would not correspond either in site or even general direction with the anterior border of the muscle. On the other hand the muscle border indicates the line along which sinuses due to pathological conditions (as recognised in the adult) will form.

This hypothesis was proposed to account for sinuses rather than cysts but, in any case, does not provide a reasonable correlation between early embryonic and adult structures, nor even begin to account for the various features of the cysts.

"Thymic Duct" Hypothesis.

This idea of cysts arising from the thymic duct at first sight appears to be supported by the distribution of many of them below the hyoid bone, and the presence of thymic tissue in the walls of a considerable proportion of them. There is, however, the same problem as discussed above of deriving adult structures directly from early embryonic structures.

If the thymic duct be regarded as a circumscribed and fixed structure, then the superficial cysts and those occurring in the salivary glands are in a different tissue plane,

and therefore the direct development of one into the other presents difficulties. This is another example of an idea which, even if representing some part of the truth, is stultifying since it ignores (and encourages us to ignore as if they were unimportant) all the stages between the first month of embryonic life and adult life.
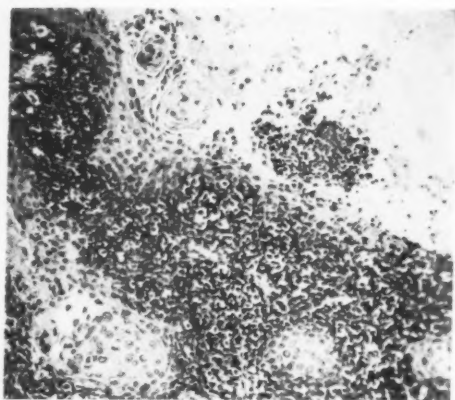

FIGURE XIII. Photomicrograph of portion of an enlarged lymph node taken from the jugular chain near the carotid bifurcation. The epithelium (of typical stratified squamous type) lined the sinusoids and merged into the lymphoid tissue. Special, prolonged and repeated search failed to show any tumour in the region. x 130.

From the wide distribution of thymic tissue in the neck—in the thyroid gland and in the superficial and deep tissues from the hyoid bone to the manubrium sterni—it is clear that the thymic duct does not remain circumscribed in form. Its cells become inextricably mingled with all the tissues of the neck and these cannot be followed to all their various and variable sites. Even if we postulate that the cysts arise in this thymic tissue, this is quite a different idea from an origin from the thymic duct itself. Furthermore, the uncertainty that all thymic tissue comes from the thymic duct is sufficient to challenge the hypothesis.

It is clear, therefore, that when these hypotheses are examined critically not only is there no real evidence for an origin of the cysts from the various embryonic structures cited, but also the acceptance of such a view immediately raises many other problems.

DISCUSSION

The real problem of the cysts described here is that all the ideas regarding them revolve round an archaic terminology and an assumed origin from organs found in the earliest stages of the embryo. They must necessarily arise from some structure or tissue which is present and apparent at the time of development of the cyst. The progenitor of this tissue is a secondary problem. It should be emphasised that the hypotheses discussed above are no more than speculations, and scrutiny shows that there is little basis for them.

They arose out of a rigidity of outlook characteristic of the embryology and pathology of the last century. When a structure or an organ was formed, it was thought that necessarily some indelible imprint was imposed on its cells so that these were destined thence to produce only certain types of cells. A corollary of this idea was that such peculiarities were indicated by specific morphological characters, and therefore transformations from one structure to another could be followed easily through all stages. Furthermore, any structure in the adult must be related necessarily to some specific structure in the embryo. However, embryology itself has gradually outgrown this stage.
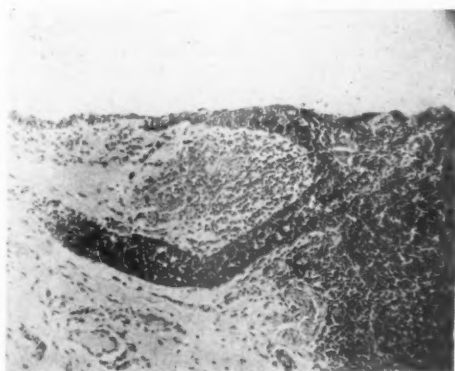

FIGURE XIV. Photomicrograph of portion of the wall of a cyst, showing an area where epithelial cells and lymphoid tissue closely intermingled form a mass projecting into the deeper tissue. x 60.

The statement of Drummond (1898) is worth repetition: "The human embryo is a subtle phantasmagoria, a living theatre in which a weird transformation scene is being enacted, and in which countless strange and uncouth characters take part. . . . As the embryo unfolds, one by one these animal actors come upon the stage, file past in

phantom-like procession, throw off their drapings and dissolve away into something else." Emphasis should be placed on the dissolution of one group of structures to make way for their successors. The common notion that structures in the early embryo necessarily give rise to particular organs is a chimera out of accord with recent investigations. Even in the early days of the century Jenkinson (1906) stated: "The facts forbid us to see in these elementary organs of the embryo that definite predetermination of certain ontogenetic function."

These views, based on direct observations of embryos, have been supported and emphasised by the results of experimental work of Spemann, the Mangolds, Harrison, Waddington and many others. It is not proposed to discuss this work in detail, but in so far as it has completely revolutionised embryology, it cannot be ignored in the study of any problem involving consideration of the early embryo. The work done has been great, and though much is still in an early stage, it is quite clear that which cells give rise to a particular tissue depends largely on the presence of chemical substances (organisers) or the interaction of cells (individuation fields). Thus, for example, provided the appropriate stimulus is applied, an eye may be formed on the trunk of an embryo instead of in the head. Very many examples could be quoted, but this work is mentioned merely to indicate that no conclusion from embryological studies should be drawn without a clear appreciation of the significance of this rapidly accumulating information—that cells in the early embryo possess potentialities not normally exhibited by them nor suggested by their structure.

In many pathological conditions there is exhibited evidence of cell potentialities which are never even suggested in normal circumstances. They are much less easily evoked than in the embryo, but it is apparent that they are much greater than was thought in the last century.

In the cysts it is apparent that the lining developed from cells which were able to become epithelium of a squamous type. Such cells could be of two kinds: (i) a thymic duct may have persisted and thus cells morphologically epithelial were present; or (ii) the thymic duct (or other structures) "dis-

solved" away, leaving cells which were "something else" in appearance but which retained the capacity of producing epithelial cells.

The presence of epithelium in some lymph nodes might be taken to represent epithelial remnants or "rests." However, gradations from endothelium to stratified squamous cells suggest that their origin is recent rather than that they are something unchangeable.

Our nomenclature for cells depends at any time on their structure, and this probably also reflects their function, but it is no indication of their remote (nor necessarily their immediate) origin. This is another way of saying that structure of cells is not any indication of their potentialities. It is most important to remember that when we say that a cell is endothelial or epithelial in character we are only stating its form in the particular circumstances in which it happened to be when examined, unless other evidence is available.

It is desirable that we have an hypothesis as a guide to further investigation, but on what can we build it? There are some general features. The cysts occur in a well defined area which is characterised by a clear-cut epithelium lymphoid tissue association. The cysts are found in close association with lymph nodes or in areas where they or lymphoid tissue collections are to be found. This distribution of cysts is quite different in kind (and in implication) from that commonly described.
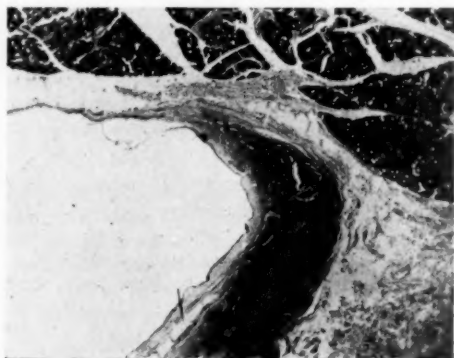

FIGURE XV. Photomicrograph of a cyst in close relationship with, but not incorporated in the parotid gland. x 12.

Certain deductions may be drawn from the structure of some cysts. In most the epithelium is stratified and mature, but in a few in which there is cellular variation the epithelium does not appear to arise from pre-formed "epithelium." The single layer of flattened cells merging gradually into a stratified epithelium, its occurrence in sinusoids (Figure IX), and its position in the middle of some nodes makes an origin from cells which are endothelial in form reasonably certain. This applies also to the epithelium found in lymph nodes apart from cysts. The indications therefore are that the epithelium arises from cells which, at the time the cyst is forming are, structurally at least, part of the lymphoid tissue.

In some cases the supporting tissue is thymus, when it may be assumed that the epithelium arises from the cells of the Hassall's corpuscles. The mode of development of this scattered thymic tissue requires further study.

Certain general conclusions may be drawn. The cysts have no direct relationship with any of the structures in the early embryo. Any terminology suggesting this is thoroughly misleading and should be discarded. It is not desirable to emphasise possible origins of the epithelial lining of the cyst wall, but emphasis should be placed on the incontrovertible morphological features. The terminology applied to the cysts should depend on such a feature, and therefore the name given here is proposed as having none of the dubious features of other designations. Such a term should stimulate further investigation.

SUMMARY.

1. The general features of a group of cysts of the neck (commonly designated "branchial") are described. They are found over a relatively wide area and are related more closly with lymph nodes and lymphoid tissues than with other structures.

2. The various congenital hypotheses are discussed and rejected, partly because embryological investigations have indi-cated their inadequacy and because the cysts do not show any constant features which might support these speculations.

3. The relationship of the cysts to lymph nodes and lymphoid tissue suggests an alternative hypothesis.

4. The term "Branchial Cyst" is misleading and should be discarded.

5. Since it emphasises the one constant feature of the cysts and is purely descriptive, the term "Lateral Lympho-epithelial Cyst" is suggested for the group.

ACKNOWLEDGMENTS.

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RESUSCITATION AND ANAESTHESIA.

By J. F. McCulloch.

Sydney.

A S is well recognised, the responsibility of the anaesthetist to the patient does not end with the administration of the anaesthetic, but it may only be then that his troubles are really beginning.

Resuscitation may comprise some or all of the following:—

1. Administration of fluids and chemical substances—

    Blood
    Serum
    Water
    Salt
    Glucose

2. Oxygen therapy.

3. The use of vaso-pressors.

4. Warmth.

Factors influencing the Postoperative Condition.

The decision at the end of an operation as to whether or not the patient needs any form of resuscitation depends on several factors:

The nature and duration of the operation.

This is of the greatest importance. Some operations are recognised as being potentially shock-producing and others are not. The former are often concerned with the removal of large abdominal viscera, as in a partial gastrectomy or an abdomino-perineal resection of the rectum; those where the thorax may be open for some time, as in lobectomy or pneumonectomy; and those where large amounts of tissue are removed, as in a radical removal of the breast. Extensive operations on long bones or on large joints are in the same category.

On the other hand, many orthopaedic operations, especially those associated with the use of the tourniquet, are not usually attended by shock. Nor are operations on the thyroid, though these are well recognised as being characterised by other hazards.

The shock-producing factors are mainly haemorrhagic, neurogenic, or those accounted for by the loss of heat or fluid other than blood. All of these factors operate together in varying degrees with different procedures. In radical removal of the breast, blood and heat loss are the important issues; in partial gastrectomy or abdomino-perineal resection of the rectum, blood loss and the neurogenic factor are the main components. The latter is often demonstrated in the early stages of a gastrectomy before there has been any serious loss of blood. Blood pressure readings taken at this stage often show a quite marked fall, which is corrected spontaneously when traction on the organ associated with abdominal exploration and inspection of the stomach ceases, and the actual resection is begun. Signs of haemorrhagic shock, if not prevented by adequate blood replacement, may manifest themselves at a later stage. Another procedure which is fraught with unpleasant possibilities is that sometimes described disarmingly as plastic to leg, or Kondoleon's operation. (Chart 1.) This involves the removal of skin, superficial and deep fascia, from a leg inflated by chronic lymphatic obstruction. Here are combined prolonged surgery with loss of blood and tissue fluids, as well as of heat. The total effect on the patient may be very severe, as is shown in the accompanying chart, where one litre of blood had to be poured very rapidly into a vein in order to restore the blood pressure to a normal standard. Similarly, an arthroplasty of the hip with the use of a tantalum cup was associated with a marked fall of blood pressure at the end of the operation, where unfortunately blood had not been started early enough.

The nature and duration of the anaesthetic.

This may be an important factor in influencing the post-operative state, especially if the latter be associated with shock-producing conditions. Sub-arachnoid block, complicated as it is by paralysis of vaso-constrictor fibres, has been well recognised in this regard. The fall of blood pressure

CHART 1.

ANAESTHESIA RECORD

PREMEDICATION **NEMBUTAL Gr. 1½ : MORPH. Gr. ⅓**   TIME GIVEN **I Hr. Before Op.**

METHOD **INHALATION** _(I.V.P. INDUCTION)_   **ATROPIN Gr. 1/100**   TECHNIQUE **CLOSED CIRCUIT.**

AGENTS **G.O.E.**   AMOUNTS

TOPICAL APPLICATION   "

LOCAL INFILTRATION   "

AUXILIARY PROCEDURES   ARTIFICIAL AIRWAY—

   INTUBATION — TUBE   ROUTE

   PACKS—CHEEK, ORAL, NASAL, PHARYNGEAL, CUFF.   No.   OUT   YES / NO
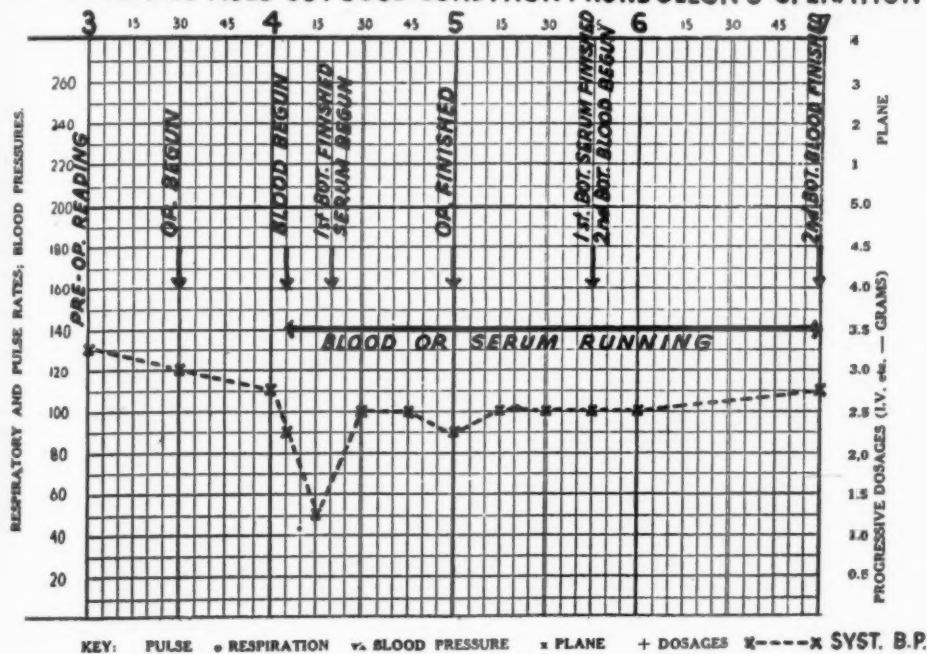
TOURNIQUET — SITE   TIME ON   TIME OFF

POSTURES — INDUCTION   MAINTENANCE

TRANSFUSION—SERUM   BLOOD   4·5   TIME COMMENCED 4·20   AMOUNT I BOT. / I BOT.   TIME COMPLETED 4·20 / 4·45

BLOOD   5·45   I BOT.   7·00

━━━ **FEMALE AGED 50. GOOD CONDITION : KONDOLEON'S OPERATION**

KEY: PULSE   • RESPIRATION   v. BLOOD PRESSURE   x PLANE   + DOSAGES   ✕----✕ SYST. B.P.

COURSE   CONDITION AT END

COMPLICATIONS — DURING— **BLOOD LOSS**

       AFTER— —

RESULT — RECOVERY, DEATH.

inherent in the technique, if added to other shock-inducing conditions, may cause the most dire results. Lundy (1945) said *a propos* the use of spinal anaesthesia in battle casualties that it had no place in the treatment of the shocked patient. Cyclopropane, while advantageous in many ways, may be followed by some very odd and disturbing phenomena (Dripps, 1947). With every care, adequate oxygenation, carbon dioxide absorption, substitution of nitrous oxide - oxygen before the end of the operation, there have been, in my experience, a number of cases in which the patients, though apparently well

on leaving the theatre, have shown signs of shock shortly after, and have in a number of instances needed the administration of serum or blood. The cause of this has been ascribed to several things, including blood loss and carbon dioxide retention. It does seem to occur, however, in some cases where such difficulties have been foreseen and apparently prevented. Pentothal, too, has often a deleterious effect on patients if used over long periods and in association with shock-producing surgery. This is seen particularly in patients of an older age group.

Extremes of age.

Patients in this group tolerate badly conditions predisposing to shock. In infants, blood loss, while not apparently severe, combined with the effect of the anaesthetic agent, may have a very adverse effect. For this reason it is most important that such operations as that for cleft palate should be concluded as quickly as possible, and if the surgeon injects a weak solution of adrenalin, blood loss is diminished still further.

Patients of an older age group often present serious problems when the need for extensive surgery arises. Nowhere has the importance of this factor been more evident than in the resumption of civil practice after some years in the army. Patients in the services were aged commonly from 20 to 35 years, and the incidence of hypertension and other vascular diseases almost nil. Doses of pentothal of from 2 to 3 grammes were by no means uncommon and were rarely followed by anything more serious than a long sleep. Heavy dosage in civilians of an older group has been characterised by prolonged narcosis and profound respiratory and circulatory depression, and it is now generally agreed that except in short cases smaller doses of pentothal supplemented by some other form of anaesthesia give better results.

So-called Bad Risk Patients.

This is a fairly large group and one which is difficult to define accurately. Included in it are those who suffer from chronic diseases, like pulmonary tuberculosis, rheumatoid arthritis and the like. Patients suffering from chronic malnutrition resulting from carcinoma or other lesions of the alimentary tract are also to be regarded with great suspicion. It is commonly found in such cases that the general condition of the patient may apparently be reasonable, and laboratory findings like haemoglobin concentration, red cell count, serum protein, and systolic blood-pressure within normal limits, and yet they tolerate very indifferently even minimal surgery and blood loss.

Another class of patient whose behaviour at or after operation may cause some concern is the hypertensive. Whatever may be the cause, such patients have on many occasions shown marked intolerance of blood loss, or perhaps more specifically sudden falls of blood pressure associated with surgery or anaesthesia.

SOME FACTS RELATING TO RESUSCITATION.

There are some important facts which should be stressed in this regard:—

1. The circulating blood volume varies from 4,000 to 6,000 c.c., in the normal human adult.

The circulating blood volume is one of the most important considerations in the maintenance of physiological equilibria. The method of its estimation is commonly by the use of a dye, Evans blue, but this unfortunately is not a quick, simple method capable of performance in the operating theatre, and the assessment of the circulating volume is still largely clinical. Sufficient work, however, has been done to show that it may in certain cases be markedly reduced without any very definite evidence preoperatively.

What is even more important than the amount of circulating blood is its relationship to the capacity of the vascular bed at any moment, as it is when there is a gross disparity between the two that signs of shock appear. This may be due to a diminution in blood volume, as with a sudden haemorrhage, or to vaso-dilatation from other causes. Of these, the effect of spinal anaesthesia and neurogenic shock from sudden pain or emotional disturbance are classical instances. Here there is no blood loss, yet the condition closely resembles traumatic shock with hypotension, pallor and sweating. There is, it is true, an over-action of the para-sympathetic factor controlling cardio-vascular dynamics, as is shown by a soft, slow pulse, but after all tachycardia is by no means invariably

associated with traumatic shock, particularly in early stages.

As is usual in medicine, where the use of the word "never" is to court disaster, these conditions often occur in combination. This is shown in abdomino-perineal resection of the rectum under spinal anaesthesia. Here concurrently are blood loss decreasing the circulating volume, and vaso-dilatation caused by neurogenic shock as in mesenteric traction and the effect of the anaesthetic.

The clinical assessment of decrease in the circulating blood volume is fraught with difficulty. It has been shown by several observers that decrease occurs in hypoproteinaemic dogs, and in human beings suffering from malnutrition. Experience in the army with battle casualties, or those suffering from infected burns, has shown that beyond all doubt in certain conditions associated with gross and chronic sepsis, the clinical improvement after transfusions, often given in spite of a completely normal blood picture, can only be explained along these lines. Similarly, those suffering from advanced malnutrition associated with gastric or oesophageal carcinoma often display a complete transformation in outlook after the administration of blood, again often given in spite of a normal blood picture. A similar condition may well exist in the group referred to as "bad risk patients." It is commonly found that, with patients who suffer from chronic pulmonary tuberculosis and who are having serial thoraco-plastic procedures, patients who frequently present in a state of very good nutrition with normal blood findings, a relatively minor loss of blood causes a quite disproportionate degree of shock. Such a state of affairs may well be explained as a preoperative diminution in the blood volume.

2. It is most important to restore to normal before operation the circulating volume and its constituents.

This is quite evident in cases where there has been a recent haemorrhage and therefore loss of whole blood. In conditions of anaemia, red cells and haemoglobin are deficient. In the present state of our practice, cells only would appear the obvious choice, but whole blood is much more convenient and seems to work well.

American workers are highly conscious of the necessity of restoring to normal such blood constituents as chlorides and proteins. Cases operated on without this being done seem to face much greater hazards in the postoperative stage; if not immediately after operation, then some weeks later. The virtues of such a regime as that of Varcoe, with its high caloric value, can hardly be over-estimated when, by its use, weight increase of ten pounds per week is not unknown.

3. Standards in current use for preoperative assessment of the patient's condition are often quite fallacious.

These are estimation of haemoglobin and serum protein, erythrocyte count and haematocrit reading. It is quite apparent that each of these is relative; it concerns something per cent., but gives no idea of the total amount. A haemoglobin estimation of 14 grammes per cent. gives a pleasant feeling of reassurance, but it may be associated with a considerable reduction in the blood volume, of which there is no sign. Similarly, a serum protein value of 6 grammes per cent. means little if the total amount of body protein is significantly reduced. Such deficits may only be unmasked, and then with disturbing suddenness, during or after some major surgical procedure.

4. When, following haemorrhage, signs of shock appear, 20 per cent. to 30 per cent. of the circulating blood has been lost. When there are signs of severe shock, 35 per cent. to 40 per cent. has gone and should be replaced at once.

These figures have been amply proved by a series of blood volume estimations carried out by Noble and Gregersen (1946) on patients with varying degrees of shock. They can be confirmed almost daily, with reasonable clinical accuracy in any operating theatre where really major surgery is done, as it seems reasonable to infer that, in cases of haemorrhagic shock, the amount of blood necessary to restore the blood pressure to something approaching its normal preoperative level represents with a fair degree of accuracy the amount that has been lost. (Chart 2.) That such loss is not at once apparent is a lasting tribute to the vascular compensatory mechanisms and their wonderful efficiency, but only up to a point. It is

CHART 2.

ANAESTHESIA RECORD

PREMEDICATION **OMNOPON Gr.⅙ SCOPOLAMINE Gr.1/150** TIME GIVEN **1 Hr. Before**
METHOD **INTRAVENOUS & INHALATIONAL**   TECHNIQUE **CLOSED CIRCUIT**
AGENTS **GAS-OXYGEN ETHER**   AMOUNTS

TOPICAL APPLICATION   "

LOCAL INFILTRATION   "

AUXILIARY PROCEDURES   ARTIFICIAL AIRWAY—

    INTUBATION — TUBE   ROUTE

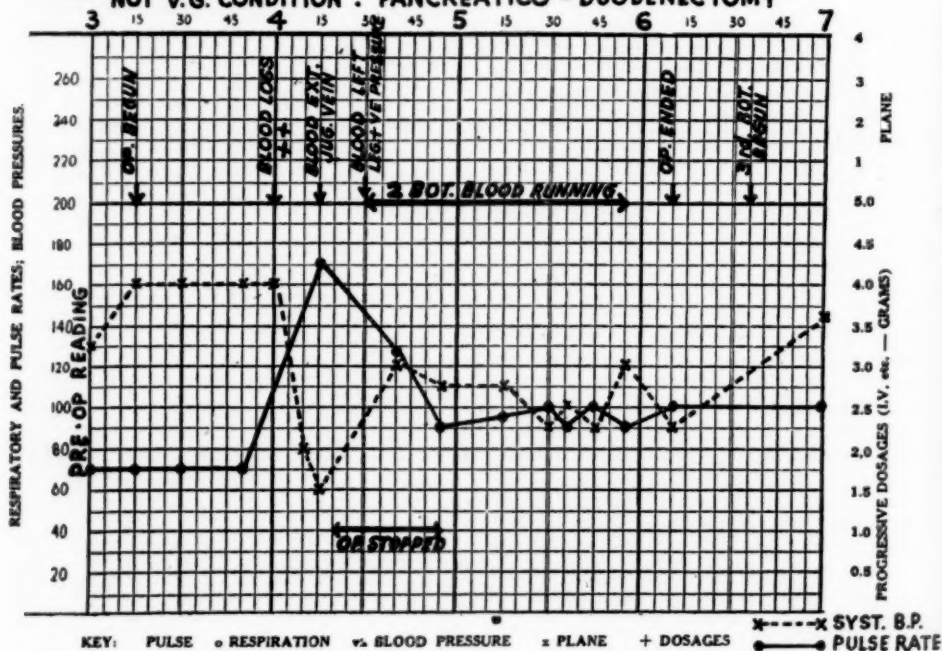   PACKS—CHEEK, ORAL, NASAL, PHARYNGEAL, CUFF.   No.   OUT YES
                                       NO

TOURNIQUET — SITE   TIME ON   TIME OFF

POSTURES — INDUCTION   MAINTENANCE

TRANSFUSION—BLOOD TIME COMMENCED **4.15** AMOUNT **1 BOT.** TIME COMPLETED **5.55**
~~SERUM~~ **4.30**   **1 BOT.**   **6.35**
~~SALINE~~ **6·35**   **1 BOT.**

FEMALE, AGED 48
NOT V.G. CONDITION : PANCREATICO - DUODENECTOMY

KEY: PULSE   o RESPIRATION   v. BLOOD PRESSURE   x PLANE   + DOSAGES   x----x SYST. B.P.
                                                                              •——• PULSE RATE

COURSE   CONDITION AT END **FAIR**

COMPLICATIONS — DURING— **MASSIVE BLOOD LOSS**
~~AFTER—~~
                                          RESULT — RECOVERY, DEATH.

when the point has been passed, however, that things begin to happen fast. The fallacy of waiting till signs of shock appear before preparations for resuscitation are begun, needs no stressing, in view of these figures, but unfortunately still occurs with lamentable frequency. The importance of replacing blood before the effects of its loss have become clinically manifest cannot be overemphasised.

In order to avoid being caught unprepared it is wise to have blood ready and to begin a transfusion in any operation which is

usually associated with marked operative shock. This is current practice in most of such procedures nowadays. Thus, all patients who are having a gastrectomy done have a transfusion started as soon as the surgeon has decided that the case is operable. The same routine is carried out with any major bowel resection, and, of course, with lobectomy or pneumonectomy. With other operations where bleeding is common in some degree, as prostatectomy or radical removal of the breast, the patients are typed and blood is cross-matched and ready in the theatre for a high proportion of them. This

CHART 3.

ANAESTHESIA RECORD

PREMEDICATION **NEMBUTAL** Gr. $1\frac{1}{2}$ **MORPH.** Gr. $\frac{1}{6}$ }   TIME GIVEN **I Hr. Before Op.**

METHOD **ENDOTRACHEAL**   **ATROPIN** Gr. $\frac{1}{100}$ TECHNIQUE

AGENTS **ETHER AND CYCLOPROPANE**   AMOUNTS

TOPICAL APPLICATION   ”

LOCAL INFILTRATION   ”

AUXILIARY PROCEDURES ✓   ARTIFICIAL AIRWAY—

   INTUBATION — TUBE   ROUTE **NASAL**

~~BACKS CHEEK, ORAL, NASAL, PHARYNGEAL, CUFF.~~ **FACEPIECE** No.   OUT **YES** ✓
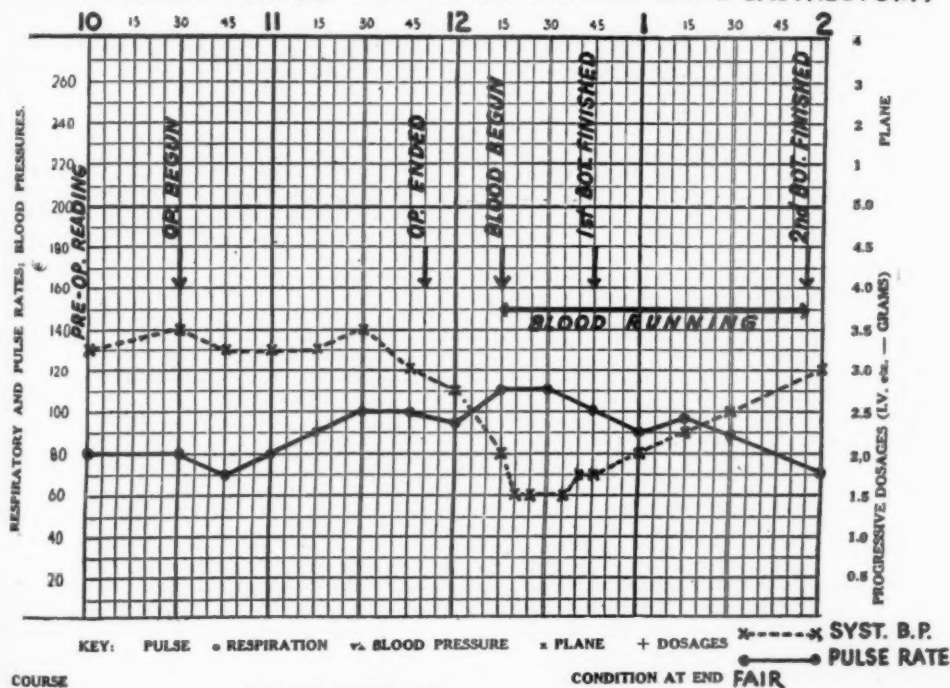   NO

TOURNIQUET — SITE   TIME ON   TIME OFF

POSTURES — INDUCTION   MAINTENANCE

TRANSFUSION — BLOOD ~~SERUM SALINE~~   TIME COMMENCED **12.15 12.45**   AMOUNT **I BOT. I BOT.**   TIME COMPLETED **12.45 2.00**

▬▬ **MALE AGED 52. GOOD CONDITION: SUB-TOTAL GASTRECTOMY**

KEY: PULSE   ● RESPIRATION   ∇ BLOOD PRESSURE   × PLANE   + DOSAGES   ✗-----✗ SYST. B.P.   ●——● PULSE RATE

COURSE   CONDITION AT END **FAIR**

COMPLICATIONS — DURING **BLOOD LOSS ++**
~~AFTER~~ **HYPOTENSION**

RESULT — RECOVERY, ✓ DEATH.

involves, in private practice, a considerable degree of personal exertion, but knowing the group of the patient and having blood, if not ready at least easily available, is a great morale builder. A few experiences in which I have been caught unprepared have underlined this in my mind. One such was when a surgeon, for whom I have the highest regard, said he thought that a patient on whom he was to perform a gastrectomy for a duodenal ulcer was in such good condition that a transfusion was unnecessary. The patient was aged fifty and very well. Operation was difficult and a good deal of unspectacular bleeding occurred, but the surgeon seemed to think blood was not called for, though readily available. Quarter-hourly estimations of systolic blood pressure and pulse rate showed no significant change until the peritoneum was closed, when the patient sudden appeared rather pale and his blood pressure was found to be 80 mm. of mercury. A few minutes later it was 60, and shortly after almost unregistrable. In that case, the first litre of blood was given in under half an hour, and it was only after the second litre had been almost completed that the blood pressure reached and stayed at a reasonable level. (Chart 3.)

Without being quite clairvoyant, it is, of course, impossible to foretell the occurrence of serious bleeding in an operation not commonly associated with such an emergency. This was a recent experience of mine when a surgeon, in removing a stone from the kidney, encountered persistent bleeding which necessitated several transfusions. One or two similar experiences as that referred to above, when a surgical extravaganza lurked behind the innocuous description of plastic to leg, have stressed the importance of discovering, when possible, what the surgeon's intentions are. (Chart 4.)

INDICATIONS FOR REPLACEMENT OF FLUID OR CHEMICAL SUBSTANCES.

Blood.

Bleeding which persists, in spite of all attempts to control it, for more than a few minutes may often, particularly in a poor risk, determine preparations for transfusion even in the absence of clinical signs of blood loss. In many cases, by the time preparations are complete, the signs have appeared. The accumulation of blood in the sucker bottles and in sponge dishes may give a rough idea of the extent of the blood loss and its seriousness or otherwise. Such conditions may often escape the surgeon's notice and should be watched for.

The conditions mentioned above may be described as relative indications. Signs of shock, such as falling blood pressure, rising pulse rate, pallor and sweating, associated with significant blood loss, may be considered absolute indications. It sometimes happens that the blood loss appears to be small and not a likely cause of the patient's condition. The surgeon may feel that his ability is being criticised by the suggestion of a transfusion. There are often several factors in the production of the patient's condition, but blood loss is undoubtedly the most significant, and even when it is apparently small, if there is doubt, I feel that the patient should be given the benefit of it and blood as well. A certain hesitancy is understandable if the situation arises at the end of a long day and involves taking blood, typing, centrifuging and cross-matching, but a transfusion under such condition gives everyone a great sense of satisfaction, and the patient a far better chance of uneventful convalescence.

In this connection one might mention the significance of the systolic blood pressure at the end of the operation. In cases commonly associated with shock, a blood pressure record throughout the operation is of great importance, as a persistent fall is one of the earliest available signs of the onset of shock. No patient of mine with a systolic blood pressure of less than 100 mm. of mercury is allowed to leave the theatre. This, of course, presupposes a normal preoperative pressure of 120 or more. A postoperative systolic reading of 80 has obviously a very different significance when viewed against a background of a normal preoperative reading of the same level.
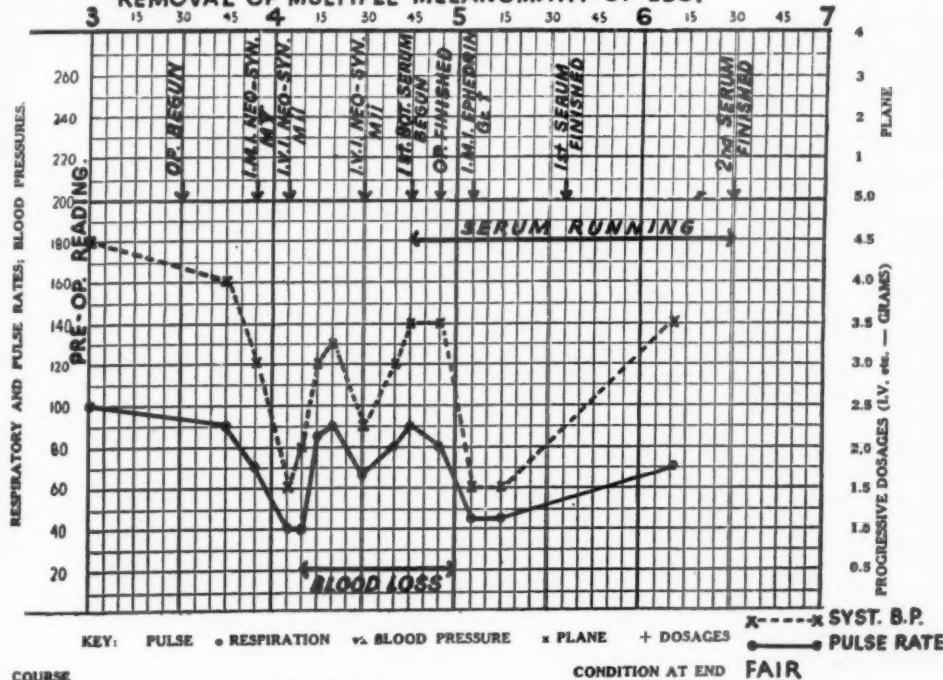
Rate of Flow.

The rate of flow of the blood is determined primarily by the rate and extent of its loss, and naturally by the effect of that loss upon the patient. Where signs of shock have already appeared, there must have been a blood loss of from one to two litres, and this amount must therefore be replaced; the sooner, the better. The fact that one litre run in, in from 15 to 20 minutes, is some-

CHART 4.
ANAESTHESIA RECORD

PREMEDICATION **OMNOPON Gr.$\frac{1}{3}$ SCOPOLAMINE Gr.$\frac{1}{150}$**   TIME GIVEN **I Hr. Before Op.**

METHOD **SPINAL**   **EPHEDRIN. G.T.**   TECHNIQUE

AGENTS **NUPERCAINE I-200 c̄ GLUCOSE**   AMOUNTS **I.7 C.C.**

TOPICAL APPLICATION   "

LOCAL INFILTRATION   "

AUXILIARY PROCEDURES   ARTIFICIAL AIRWAY—

     INTUBATION — TUBE   ROUTE

     PACKS—CHEEK,   ORAL,   NASAL,   PHARYNGEAL,   CUFF.   No.   OUT   YES / NO

TOURNIQUET — SITE   TIME ON   TIME OFF

POSTURES — INDUCTION   MAINTENANCE

TRANSFUSION—~~BLOOD~~ SERUM ~~SALINE~~   TIME COMMENCED **4.45 / 5.35**   AMOUNT **I BOT. / I BOT.**   TIME COMPLETED **5.35 / 6.30**

MALE AGED 45. GOOD CONDITION
REMOVAL OF MULTIPLE MELANOMATA OF LEG.

KEY: PULSE   • RESPIRATION   v̽ BLOOD PRESSURE   × PLANE   + DOSAGES   x----x SYST. B.P.   •——• PULSE RATE

COURSE   CONDITION AT END **FAIR**

COMPLICATIONS — DURING— **HYPOTENSION / BLOOD LOSS** ~~AFTER~~

                                         RESULT — RECOVERY,   DEATH.

times necessary to raise the blood pressure to a reasonable level, shows how great may be the need. Two transfusions running simultaneously may be necessary to keep pace with blood loss. This occurred in the cases of a pancreatico-duodenectomy (Chart 2) where the inferior mesenteric vein was cut and the blood pressure fell to an alarmingly low level. It happens, on occasion, that the rate of flow of a transfusion already in progress during an operation is not fast enough to keep pace with the blood loss, and the blood pressure falls. An increase in transfusion speed is the best means of raising

the pressure. The total amount of blood given is determined, as is the rate, by the amount and rate of the loss. So long as the blood pressure is much below the normal level, blood should be given. When the blood pressure and general conditions are restored, a further litre should be run in slowly in the absence of further haemorrhage.

Risks of Transfusion.

These are well known, but should never be overlooked. Group incompatibility is unlikely to occur if the recipient is typed and cross-matched against the donor's cells. Incompatibility of the rhesus factor is always a possibility and should be guarded against, particularly in girls and young women. The possibility of infection of a serious character from the blood itself is very small in these days of blood banks. The possibility of infection from a badly prepared giving set must be always borne in mind and guarded against by scrupulous attention to detail in cleaning and autoclaving.

There are still those who are haunted by the spectre of over-transfusion, thereby causing pulmonary oedema. This is undoubtedly a possible risk, but a very small one if reasonable care is taken. As Edwards (1948) says: "The healthy heart whose normal output is about 5 litres per minute can easily cope with transfusions of 100 c.c. per minute until the total volume is restored." At the rate mentioned, 1 litre would run in in ten minutes.

Serum.

The use of serum immediately after operation may be a life saving measure when no blood is immediately available, as a means of restoring the blood volume to something like normal limits. The amount and the rate at which it is given are determined by those mentioned in relation to the transfusion of blood. The intravenous use of serum during the later postoperative phase may also be life saving as a means of introducing much-needed protein and raising the osmotic pressure. This occurs in cases of acute dilatation of the stomach and duodenal ileus, as well as in other conditions. It may be a practical way of giving protein as food, where oral administration is out of the question. Assuming the plasma protein concentration to be 6 grammes per cent., 1 litre gives 60 grammes.

Water.

The average daily requirements of a patient at rest in bed are between 3.5 and 4 pints, which equals 70 to 80 ounces and 2 to 2.3 litres. This covers excretion by kidneys, lungs and sweat glands. With adequate intake such as this, the urinary output should be copious, up to 3 pints in 24 hours, and of a low specific gravity. This allows for adequate excretion of waste products where the kidney is unable to concentrate to normal levels.

Where fluid cannot be taken by mouth, as occurs after gastrectomy or similar operations, or where gastric suction is in progress, it must be given intravenously and the total intake, including sufficient to compensate for that lost by gastric suction or from intestinal fistulae, balanced against the urinary output.

Salt.

The daily requirements of 8 grammes of sodium chloride is assured in normal health by the average diet. In the post-operative period, where feeding by other than the oral route is essential, this must be given in some intravenous fluid. To curb the enthusiasm of those inclined to the free use of normal saline, it must be pointed out that one litre of this contains 9 grammes of sodium chloride, enough for 24 hours. With the body in chloride balance and the kidneys functioning normally, 5 grammes per litre of urine is a satisfactory output. This can be shown by the use of the Fantus test. Where there is any doubt as to the correct chloride level, the blood chlorides must be estimated. Coller and Maddock (1940) suggest giving .5 gramme of sodium chloride per kilo. of body weight for every 100 mgm. that the blood chlorides fall below normal (580-630 mgm. per cent.).

Glucose.

The average intake, where no food is being taken, should be from 100 to 150 grammes.

Protein.

The average daily intake under the conditions referred to should be 100 grammes. Where feeding during the postoperative phase by other than the oral route is necessary, two to three litres of 4 per cent. dextrose in fifth normal saline, which contains

80 - 120 grammes of glucose and 3.2 - 4.8 grammes of chloride, is sufficient for from 24 to 36 hours. Where intravenous therapy must be continued for longer periods, the protein deficiency can be made good by serum, and chloride lack by giving normal saline.

The content of abnormal fluids has been estimated as follows (Dripps, 1946) :—

Vomitus .. 3.3 grammes of salt per litre
Gastro-duodenal suction   5.7
Bile 5.1
Intestinal 4.1

Where vomiting, gastric suction or intestinal fistulae occur, the deficit in chloride and fluid must be adjusted accordingly.

THE USE OF PRESSOR DRUGS.

The pressor drugs in common use are ephedrine and neosynephrin. These are chemically similar and both are related to adrenalin. Their main action is on the peripheral nerve endings, resulting in vaso-constriction and increase of peripheral resistance, but each has other actions as well, such as increase in cardiac output and, in the case of ephedrine, a stimulant action on the central nervous system. There is a constant search for pressor drugs with a more prolonged action than that of those mentioned. Methedrine seems to have some advantages over the others.

Dripps and Deeming, in investigating the effects of this drug in spinal anaesthesia, concluded that the mean drop in the systolic blood pressure was 3 per cent. in 500 cases, compared with a drop of 14.5 per cent. in a similar number of cases treated with ephedrine.

The use of a pressor drug at the end of operation is determined by the cause of the hypotension. If this be due to severe blood loss and therefore diminution in the circulating volume, vaso pressors have no place. If, on the other hand, the fall of pressure

is due to vaso-dilatation such as may occur in spinal anaesthesia, and to a lesser extent following pentothal, ephedrine or neosynephrin may be extremely useful. In cases of emergency one minim of 1% neosynephrin intravenously gives a most active, though temporary effect. Either of these drugs given intramuscularly has a more prolonged effect.

OXYGEN THERAPY.

Every anaesthetist aims at returning his patient to bed with no respiratory obstruction, adequate oxygen intake and removal of carbon dioxide. This normally presents no difficulties, but in some operations, particularly those in which the muscles of respiration either in the thoracic wall or diaphragm have been interfered with, the oxygen content of the atmospheric air is insufficient and oxygen has to be given from a cylinder. This may be necessary also if there is any irremediable respiratory obstruction or cyanosis from other cause. One of the great difficulties in this matter is that the conscious patient in need of oxygen is often so ill and restless that its administration may be extremely difficult. Short of oxygen tents and rooms, which are usually impracticable, nasal catheters or B.L.B. masks are the most efficient. The usual rate of flow is 6 - 8 litres per minute. It should be continued while the patient will tolerate it, or derives any symptomatic comfort from it.

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SOME ASPECTS OF THE SURGERY OF THE PANCREAS.

By W. Maxwell.

Sydney.

IT is proposed to deal briefly with some aspects of the recent developments in pancreatic surgery, in which, however, the writer has had such meagre experience that any expressions of opinion will be of little significance.

The conditions described in the cases recorded will include pancreatic calculi, islet cell tumour, carcinoma of the ampulla of Vater, and carcinoma of the pancreas.

PANCREATIC CALCULI.

The outstanding symptom of this distressing condition is severe pain in the epigastrium, the left hypochondrium, or at the umbilicus, often radiating through to the back. It may be constant or occur in paroxysms, and is apt to be severe three or four hours after meals. The periods between attacks may be weeks or months, but it is usual for the attacks to increase both in frequency and severity as time goes on. It commences most commonly in the fourth decade. An epigastric mass may or may not be palpable.

Apparently the pathological changes in the gland vary in relation to the stage of activity. It may be small and fibrotic (Martin and Canseco, 1947) or of normal size, but in most it is enlarged and cysts may be present. Multiple calculi are the rule, with dilated ducts and acinar atrophy through varying portions or the whole of the pancreas. The islet cells may or may not be reduced in number. The calculi vary in size and number and may be confined almost wholly to the head or the tail, or may occur throughout the whole organ.

The outstanding clinical fact of the condition is that these attacks, suspected as being due to cholecystitis or a duodenal ulcer penetrating the pancreas, may occur for some years before the calculi can be demonstrated radiographically. The patients are likely to become morphine addicts and it is imperative that something be done to relieve pain. Canseco (1947) says that it is probably true that if the pain does not first wear out the patient, it may cease as the pancreas becomes atrophied, and that this naturally increases the chances of the development of diabetes.

Five methods of surgical treatment have been employed at the John Hopkins Hospital, the operation of choice being ligation of the pancreatic ducts. Subtotal pancreatectomy has been done. Rienhoff has performed sympathectomy, splanchnicectomy, and vagotomy. One case is recorded in which Blalock performed total pancreatectomy, while the fifth type of operation, which has been abandoned, was pancreatotomy with removal of calculi.

After ligation of the ducts with consequent pancreatic atrophy, or after pancreatic resection, replacement treatment by one or other of the pancreatic fractions was necessary to maintain lipolytic equilibrium and avoid frequent bulky fatty stools.

Parsons of New York (1947) says that resection of the involved portion of the pancreas is the indicated treatment. At the Presbyterian Hospital five partial resections have been done without fatality, and two total pancreatectomies with one death, but he adds that this is too small a series to be significant.

CASE 1.

A male patient, aged 50 years. He had epigastric pain radiating through to the back for eight years, the pain becoming much worse in the last eight months. Lately it had occurred in bouts lasting up to three weeks and became paroxysmal after meals. Recently he had frequently required morphine to relieve the pain, at times given before a meal to enable him to eat it. He had lost thirty-five pounds in weight in eight months.

In the last few years he had had radiographs of the alimentary tract and gall bladder on several occasions. Dr. R. J. Taylor, his physician, referred him to me after Dr. Anderson Stuart had detected pancreatic calculi in doing a Graham's test. The calculi (Figures I and II), some almost as large as a threepence, were most numerous in the head and tail of the organ, but were also present in the body. On admission to hospital, I had a lateral ray done, and the more deeply placed calculi were seen

to be two inches anterior to the bodies of the vertebrae, this raising the suspicion that the shadows may have been calcified mesenteric glands.

At laparotomy (16/12/48) the pancreas was found to be greatly enlarged: it was eight inches long, four inches wide, and three inches in thickness; it was indurated so that individual calculi could not be palpated. The spleen was enlarged to the sub-costal margin with firm adhesions to the diaphragm, the posterior wall of the gastric fundus, and the left extremity of the body of the pancreas. The head of the pancreas extended to the portal fissure above and was also adherent to the hilus of the right kidney. Pancreatectomy was not feasible and the abdomen was closed. Three weeks later Mr. Douglas Miller resected the splanchnic nerves and the sympathetic trunks from the ninth to the twelfth dorsal ganglia on both sides. Now, four months later, the patient is completely free of pain.
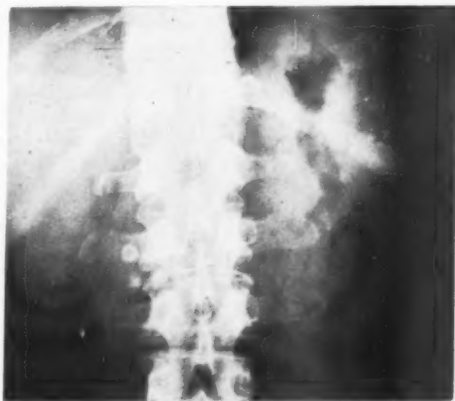

FIGURE I.   Case 1.   Antero-posterior X-ray showing pancreatic calculi.

A more recent female patient has been seen, in whom the calculi were discovered while having an intravenous urogram carried out. There are a few large calculi in the body and tail and numerous small ones in the head. Her symptoms date back for several years, but have not to date required morphine. Investigations are incomplete at date of writing.

The author has not had sufficient experience to comment helpfully on an operation of election in this dire condition, but it would appear that sympathectomy involves far less risk than resection of pancreas, and gives reasonable prospects of relief. I have been unable to find a description of Reinhoff's technique for ligation of the ducts, and have written to him. From his published description of the anatomy of the ducts the

procedure gives little promise of being easy. Since this was written, a very kind letter from Dr. Reinhoff (13/3/48) informs me that he favours sympathectomy for calculosis, and that if anything further need be done, ligation of the pancreatic duct.

Islet Cell Adenoma with Hypoglycaemia.

This condition, caused by a hyper-functioning adenoma of islet tissue, single or multiple, at times apparently only micro-scopic, may be diagnosed on the basis of the triad of Whipple (Parsons, 1947) — attacks of nervous or gastro-intestinal dis-turbance occuring in the fasting state; a hypoglycaemia below 50 mgm. per 100 c.c.

FIGURE II.   Case 1.   Lateral X-ray showing calculi.

of blood; attacks relieved immediately by the taking of glucose.

Tumours of various sizes may be en-countered at operation, or no tumour may be recognised after a careful inspection of the whole organ. Parsons suggests that in such circumstances resection of the body and tail of the pancreas with splenectomy is indicated in the hope that one or more buried impalpable adenomata may be removed with this major portion of the organ. A total resection may be considered later.

Case 2.

A female patient, aged 50 years, had a history for one year of attacks of nausea, dizziness involving transient unconsciousness and falling on a few occasions; attacks were particularly prone to occur in the early hours of the morning, when she found that food or glucose relieved her. Her blood sugar

was 56 mg. per 100 c.c. Nothing of importance was found on physical examination.

Dr. H. A. Ryan asked me to perform an exploratory laparotomy, notwithstanding the blood sugar reading, and this was done on 20/11/47. The whole pancreas was mildly but definitely oedematous without any induration, but a search failed to reveal any abnormality other than a small firm tumour buried in the anterior surface of the head of the organ. This was hopefully removed, but at biopsy it proved to be a lymph node. The abdomen was closed.

Her subsequent history up to present time seems to have justified the avoidance of pancreatectomy. An intravenous drip glucose was given for twenty-four hours after operation, then discontinued. On the second, and again on the third, post-operative days she suddenly complained of distressing faintness and nausea, and lapsed into a collapsed and stuporose state which was relieved in five minutes on both occasions by intravenous glucose. Thereafter care was taken to give carbohydrate by mouth every three hours, and no more trouble arose.

Since leaving hospital the patient has been careful not to fast longer than four hours, and keeps glucose by her at night, as she sometimes awakens with the familiar nausea. Her future treatment must await events.

CARCINOMA OF THE HEAD OF THE PANCREAS AND AMPULLA.

Besides lesions arising in the ampulla of Vater and the head of the pancreas itself, of which the writer will refer to personal cases, the head of the pancreas may be involved secondarily in carcinoma of the common bile duct, or of the pylorus, or duodenum.

Carcinoma originates with about equal frequency in the head of the pancreas and the ampulla. Bartlett of Massachusetts (1947) reports that in twenty-five patients upon whom radical resection was done, the primary tumour was in the pancreas in thirteen cases and in the ampulla in ten. Waugh of the Mayo Clinic (1946) in thirty resections found the site of the tumour in the head of the pancreas in seventeen cases and in the ampulla in ten.

Cattell of Boston (1947) thinks that it is possible in diagnosis to differentiate carcinoma of the ampulla from carcinoma of the head of the pancreas in that in the latter the primary symptoms of indigestion and frequent bulky, foamy stools will precede jaundice, whereas with lesions of the ampulla earlier obstruction of the common bile duct

before blocking the pancreatic ducts produces pruritis and jaundice as the first symptoms.

Carcinoma of the ampulla arises from its mucosal covering or nearby mucosa, or from its lining (Lieber et al., 1939).

Malignant tumours of the pancreas are most commonly duct cell carcinomata (Brunschwig, 1948), usually of the scirrhous type, and the majority of them occur in the head of the gland.

Preoperative preparation and choice of one-stage or two-stage procedure.

These patients have been jaundiced in most cases for at least six or seven weeks, and it may require two weeks to place the patient in the optimal condition. In Case 7, quoted hereafter, a three weeks preparation was necessary, the measures adopted being blood transfusions to combat anaemia which at times is marked, and the giving of a Vitamin K preparation with bile salts. Waugh gives Vitamins B and C in addition. He states that if an elevated prothrombin time does not respond to Vitamin K, considerable liver insufficiency is present and resection should be done in two stages. Otherwise he prefers the one-stage operation for reasons which all abdominal surgeons will readily appreciate. A high carbohydrate, high protein, low fat diet is given.

Cattell prefers a two-stage operation, as he states that his patients have been jaundiced for as long as twelve weeks. The first stage consists of a cholecystojejeunostomy, and resection is undertaken about three weeks later. He has adopted the two-stage method in two-thirds of his cases.

Whipple believed that with careful preparation a two-stage operation was not necessary.

Resection.

In considering radical resection for these conditions, two considerations become of paramount importance: firstly, operability, and secondly, the diagnosis at laparotomy.

Whipple's case done in 1934 was alive six years later, but with secondary deposits in the liver. Bartlett, previously quoted, reports that in a series of twenty-five radical re-

sections there were nine postoperative deaths, the survival periods of the remainder averaging seven months, although one was still alive after five years. From these figures it would appear that resection is justifiable only in the most favourable cases. From the results of fifty-two resections with an operative mortality of 17.3 per cent., Cattell (1948) considers that only the more favourable cases should be subject to radical operation.

As regards confirmation of the diagnosis at operation, Cattell states that biopsy of the head of the pancreas is rarely of help, as a frozen section will usually show only chronic pancreatitis; he refers, too, to the fact that ampullary lesions can be biopsied by the transduodenal route, but that this is not necessary, as they can be readily felt through the duodenal wall. In all cases he holds that resection should not be proceeded with unless dilatation of either the pancreatic or biliary ducts can be demonstrated.

Waugh, previously quoted, rather favours pathological examination of fresh frozen tissue, though he states that the result, if negative, by no means rules out the presence of carcinoma. Among contraindications to resection he lists metastatic deposits in the liver, peritoneal implants, large size and fixation of the local mass, and nodules in the root of the small bowel mesentery.

As detailed so well by Cattell, certain facts must also be established as to operability before the surgeon is finally committed to resection, the gleaning of which constitute necessary steps as a preliminary to resection. These are, firstly, exposure of the portal vein above the duodenum to ensure that it is not infiltrated, and secondly, exposure of the superior mesenteric vein below the neck of the pancreas and ascertaining that it can be cleared from the pancreas in front and the uncinate process below and behind.

Palliative measures in inoperable cases.

Four procedures are enumerated by Cattell:

1. Cholecysto-jejeunostomy with entero-enterostomy.

2. Pancreatico-jejeunostomy. He describes a method for this (Cattell, 1947) and states that, used in conjunction with cholecysto-jejeunostomy, relief of the patient's condition is more marked than with cholecysto-jejeunostomy alone. The pylorus is not considered suitable for an anastomosis with the gall bladder, as the stomach does not tolerate large quantities of bile very well.

3. Ligation of the gastro-duodenal and inferior pancreatico-duodenal arteries.

4. Gastro-jejeunostomy where the duodenum shows evidence of obstruction.

Local resection of small carcinomata of the ampulla.

I first became aware of the feasibility of this procedure fifteen years ago from a case shown at a clinical evening by Mr. B. T. Edye, who informed me recently that his patient had lived at least a few years and subsequently died of another condition. Recently Brunschwig (1948) describes a technique for transduodenal resection in well-localised lesions, papillomatous in character, which are obviously superficial, but he also states that some patients have survived for years after such types of excision in cases in which the histological diagnosis was carcinoma.

CASE 3.

This was a private patient referred by Dr. C. Weston Maher. He was a male, aged 76 years, and had had painless jaundice for seven weeks, with pruritis, loss of appetite, and obvious loss of weight. Reference will be made again (Case 6) to this quick, inexplicable deterioration of general condition in a few weeks. At laparotomy on 15/12/47 the usual enormous distension of the gall bladder and common duct was present, the latter being about 5 cm. in diameter. A doubtful small thickening could be palpated through the lateral pancreatic head and through the duodenal wall, and was thought to be situated in the terminal portion of the common duct. The duct was opened above the duodenum and emptied, but scoop and probe failed to dislodge a possible stone or to pass the papilla into bowel lumen. The palpable swelling could be moved on the end of the probe. The second part of the duodenum was incised transversely, and the mass, the size of a pea, was identified as being sited on the papilla and projecting into the duodenal lumen. There was no ulceration. A circular incision the size of a shilling was made clear of the mass through the posterior duodenal wall, and the common duct exposed and cleared proximally for 1.5 cm. As the duct did not appear infiltrated, a small opening was made in it and the apex of what appeared to be a polypoidal extension upward into the duct of the papillary tumour appeared. A fine probe proved that this polyp was attached only at the papilla, and was invading no part of the duct wall. The opening in the latter was carried around

the circumference, six sutures being placed in the proximal cut margin to facilitate subsequent identification and anastomosis. Wirsung's duct was not seen. The severed duct was anastomosed to the margin of the opening on posterior duodenum.

Dr. A. H. Tebbutt reported the tumour was an adenocarcinoma.

This case parallels similar cases referred to by Brunschwig, though he advocates the method for much larger superficial lesions. The patient reported here is well after sixteen months.

CASE 4.

A male patient, aged 55, was admitted on 3/10/47 complaining of pain in the abdomen, jaundice, and looseness of the bowels for six weeks. He had no loss of appetite, but had lost 21 lbs. in weight. At operation (14/10/47) the gall bladder and common duct were greatly distended, and a mass the size of a walnut was palpable and visible in the position of the terminal portion of the common bile duct. After mobilisation of the duodenum and the head of the pancreas the portal vein was identified above the duodenum, and the mass found to be infiltrating the vein. The stomach had already been sectioned in the manner described by Waugh, so continuity was restored and the gall bladder anastomosed to the pylorus. The patient survived.

In subsequent resections I have followed the plan of Cattell, by which operability may be determined without the surgeon being committed to resection. This includes clearing of the superior mesenteric vessels and inferior border of the adjacent pancreas, ligation and division of the right gastric and gastro-duodenal arteries permitting exposure of the portal vein and its relation to the tumour, and division of the peritoneum on the right side of the duodenum and elevation of the pancreatic head. These measures can be carried out without section of the stomach or common bile duct, though in an operation of this magnitude even these steps become comparatively commonplace matters.

CASE 5.

(This case has been published in full in "The Medical Journal of Australia" of June 11 of this year. A brief summary is given here.)

A trained nurse, aged 62, was referred by Dr. G. J. Duncan, and on admission had been jaundiced for only two weeks. There was anorexia and a small loss of weight, but no indigestion. After a week's preparation laparotomy was done (22/6/48). The usual distension of the biliary system and some enlargement of the liver were present. Centred in the head of the pancreas a little below the mid point was a hard mass, one inch in diameter, which had reached the anterior surface of the gland, and which showed a scarred depression common to the appearance of scirrhous carcinoma in other sites.

Following Cattell's plan, as already outlined, it was found that the portal system was not invaded. A few venous tributaries entered both the portal and the superior mesenteric veins behind the pancreas. A real difficulty was caused by a vascular, lingula-like portion of pancreas which passed deep to the portal vein on the right side. In this case the middle colic vessels arose at the lower border

of the pancreas, and immediately gave off the inferior pancreatico-duodenal vessels. The uncinate process separated satisfactorily. The subsequent order of continuity was restored in the manner described by Waugh and Parsons, except that the proximal jejunum was closed, and the pancreatic anastomosis made proximal to that of the common bile duct and carried out by Cattell's method over a rubber tube. The gastro-jejunostomy was retro-colic and antiperistaltic. Operating time was three and a half hours.

The pathologist reported an adenocarcinoma.

The patient made a good recovery, returned to her nursing in eight weeks, and is still quite well.

CASE 6.

This case was a failure. A female patient, aged 61, had been admitted to a medical ward. She had been jaundiced for eight weeks, with nausea and vomiting for six weeks of this period, and had lost three stone in weight in twelve weeks. The weight loss she attributed to an attack of influenza. Operation was performed on 11/1/49.

Large umbilical and epigastric herniae were present; the abdomen contained a fair amount of free bile stained fluid; there was a marked hob-nail liver such as the surgeon seldom sees. A mass could be palpated in the head of the pancreas very similar to that in Case 7, and was judged to be an ampullary carcinoma. Marked distension of the biliary system was present (an important point).

As is usual with advanced cirrhosis, all visceral and collateral vessels were markedly dilated, and separation of masses of adherent omentum from the two hernias and arrest of resulting bleeding occupied some time. The head of the pancreas was mobilised: the portal vein cleared above the duodenum and the mass shown to be free of it. Oozing from enlarged vessels gave constant trouble. In clearing the superior mesenteric vein below the pancreas and the termination of the midcolic vein, the latter was torn, the tear extending in a linear direction along the superior mesenteric vein. This bleeding was fortunately arrested, but it was decided to abandon the operation because of the uncertainty of maintaining this arrest in friable vessels, and because of the difficult conditions imposed by the cirrhosis. The patient remained stuporose after operation, and died on the fourth day. One believes now that in the presence of the hob-nail liver it would have been better not to have attempted resection.

At autopsy no tumour of the pancreas was found, but the notes make no mention of the duodenum having been opened. I have no doubt that it was ampullary carcinoma.

This case illustrates, among other things, the doubts that may arise at laparotomy or subsequently in regard to diagnosis, with resultant disturbance of the peace of mind of the surgeon of which Waugh writes so feelingly.

CASE 7.

A male patient, aged 54 years. Apart from his favourable age, this patient was most unpromising; he had been jaundiced for four weeks, and in this time had lost three stone in weight. He was

admitted directly to a surgical ward by an alert casualty surgeon. He had little appetite, the jaundice was intense, the tongue dry and furred, and the red cell count 1,600,000.

Reference has already been made to this rapid deterioration in condition in some patients suffering with pancreatic carcinoma. My house surgeon promptly transfused him, and he as promptly became seized with severe precordial pain and collapsed. He was seen by Dr. R. Jeremy, the corresponding physician, who advised against early operation, and an electro-cardiograph was done which showed a degree of coronary sclerosis.

With the usual pre-operative preparation for these cases, including two further transfusions from which no reactions occurred, operation was performed three weeks later (25/1/49) in vastly improved condition, and with a red cell count of 4,600,000. Resection was carried out and continuity restored by methods similar to those adopted in Case 5. At operation a small mass, the size of a pigeon's egg, could be felt in the head of the pancreas adjacent to the mid part of the second duodenum. In this case the midcolic vessels arose from the first large jejeunal branch of the superior mesenteric vessels immediately below their crossing of the third part of the duodenum; consequently dissection in this area was carried out partly above and partly below the mesocolon. The pancreas was oedematous, and the uncinate process particularly large and adherent. The inferior pancreatico-duodenal vein was large, and immediately divided into a superficial and a deep branch. Some difficulty arose, as the vessel walls were very friable, and the deep branch was wounded by the aneurysm needle passed most carefully. The only other serious difficulty met with, apart from the dissection of the enlarged uncinate process, was a difficulty encountered also in Case 5, i.e., a lingula-like process of pancreas passing deep to the portal vein on the right side. Operating time was four and a half hours, by no means an improvement on the time occupied by Case 5.
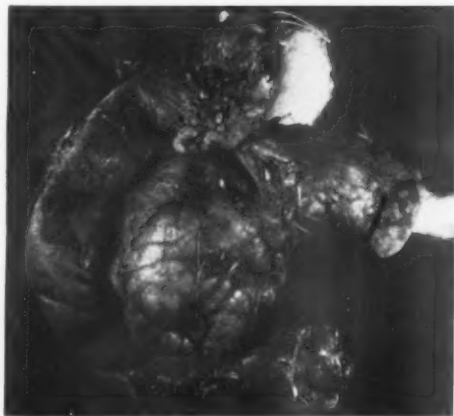

FIGURE III. Case 7. Photograph of the specimen removed at operation.

The specimen, together with a transduodenal view of the ampullary tumour, are shown in the accompanying excellent photographs taken by the Radiographic Department of St. Vincent's Hospital, Sydney.

Dr. A. H. Tebbutt reported: "The specimen consists of the pylorus, duodenum, small portion of jejeunum, the head and part of the body of the pancreas. Projecting into the lumen of the second part of the duodenum about the situation of Vater's papilla is a polypoid tumour with a smooth grey surface, but with an ulcerated area. It is of ovoid shape, 2.5 cm. in length. The head of the pancreas appears to be firm and somewhat enlarged. The common bile duct and the main pancreatic duct on the sectioned surface are dilated. The tumour is an adenocarcinoma which apparently has arisen about Vater's papilla."

The ulcerated area on the lower surface of the tumour is well seen in the transduodenal photo-

FIGURE IV. Case 7. Photograph of the tumour. The duodenum has been cut open.

graph; the pathological section site is seen at six o'clock on this area.

At operation the tumour appeared to be infiltrating in the direction of the main pancreatic duct rather than along the common bile duct.

Convalescence was uneventful, and the patient left hospital on the twenty-third day. To date he is quite well.

POSTOPERATIVE TREATMENT.

Waugh states that the post-operative course is usually smooth, but Parsons, a pioneer in this work with Whipple, points out that these operations of three to four hours duration are followed in debilitated patients by a stormy convalescence. In the cases recorded here, a Ryle's tube was left in the stomach, and suction applied for four days to avoid gastric dilatation. The gall bladder was drained for fourteen days, and an

ordinary rubber tube drain introduced through a stab wound to the site of the pancreatico-jejeunostomy for the same length of time. During this time there was a little excoriation of the surrounding skin, but no escape of fluids followed the removal of the latter tube. An indwelling catheter was left in the bladder for the first week: this is a simple and valuable method of avoiding unnecessary straining in all major abdominal resections.

An attempt was made in the first four days to maintain fluid and protein balance; for three days 500 c.c. of whole blood were given daily, with additional infusions of half a litre of 5 per cent. glucose and an amino-acid prepartion. On the third day the usual gastric resection regime of fluids and food by mouth was commenced and thereafter continued.

This routine follows closely that advocated by Parsons and Waugh. Penicillin and sulfadiazine were given for ten days, but this, I believe, is an unnecessary precaution in clean abdominal work, except where pulmonary complications are likely to, or do, ensue.

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THE ROLE OF VAGINAL HYSTERECTOMY IN GYNAECOLOGICAL SURGERY.

By Clement Chapman.

Sydney.

MUCH less than one hundred years ago hysterectomy was a desperate and occasional operation performed for malignant disease or as a last resort in cases of uterine haemorrhages. To-day hysterectomy is a routine therapeutic measure in the treatment of pelvic disease. Its indications have become more and more extended until it is now employed as an optional measure for the relief of pain, haemorrhage and discharge. By a rough estimate there are at least half a million women in Australia whose uteri have been removed. These operations have been performed by all classes of surgeons—specialist, general, and general practitioner. How important it is that the correct type of hysterectomy should be employed in order to achieve the minimum of complications and of failures! What is the role of vaginal hysterectomy in this immense surgical activity? As a glance at a saggital section of the abdomen will suggest, the vaginal route was the obvious one for the pre-Listerian surgeon to employ. Sauter of Constance in 1822 was the first to use the vaginal hysterectomy. He operated without either forceps or ligatures and his patient was cured. Recamier of Paris in 1829 tied the uterine arteries and this case was successful. The mortality rate was so high that the operation fell into disrepute and was not revived for fifty years till Czerny in 1878 did a vaginal hysterectomy for cancer of the cervix, and from then on a number of brilliant surgeons, culminating in Doyen, applied the operation in a systematic way to the treatment of inflammation, and lastly to treatment of fibroids. Doyen became very expert and his statement that "a surgeon who could perform a successful vaginal hysterectomy in private, without skilled assistance, was a true gynaecologist," still stands. Meanwhile, abdominal hysterectomy had been done first by Charles Clay of Manchester in 1843, but the patient died. He did not repeat the experiment till 1863, when he performed the first successful subtotal hysterectomy.

With the advent of antiseptic and aseptic surgery, abdominal hysterectomy, at first subtotal and later both subtotal and total, rapidly ousted the vaginal operation. The mortality rate of abdominal hysterectomy gradually fell to two per cent. Many very experienced surgeons refused to countenance the vaginal route in any circumstances. In my opinion this attitude needs revision. With improved technique and especially with the advent of the new specific remedies for combating infection, the mortality rate of vaginal hysterectomy is as low as that of abdominal hysterectomy.

In certain classes of case the vaginal hysterectomy is in my view preferable. There are great limitations to its use.

(1) The size of the uterus relative to the calibre of the vagina must be satisfactory.

(2) The uterus must be mobile.

(3) The nature of the disease process must be suitable.

Under (1) it is my opinion that unless the uterus with tumour can readily be delivered through the vagina, the abdominal route should be chosen. Treatment by "morcellement" and such complicated and dangerous measures should not be employed.

Under (2) it follows that the vaginal route should not be employed in adnexitis nor indeed where the patient has had a previous section.

(3) Malignant disease and endometriosis and cases complicated by any but the smaller ovarian cysts are unsuitable for vaginal hysterectomy. In practice it will be found that one hysterectomy in three can be carried out vaginally. Since September, 1947, I have carried out an experiment by doing vaginal hysterectomy in all the cases which fulfilled the three requirements previously mentioned. The total number of hysterectomies per-

formed by me in King George Fifth Public Hospital from 19th September, 1947, till 11th March, 1949, was as follows:—

Total number hysterectomies, vaginal
   and abdominal 217
Vaginal hysterectomies (mortality nil) . 49
Abdominal hysterectomies (mortality
   nil) 168

Of the vaginal hysterectomies:—
Hysterectomy with repair 28
Hysterectomy alone 21

When is vaginal hysterectomy the operation of choice?

(1) When prolapse is associated with a diseased uterus.

(2) When procidentia occurs in women over sixty years of age.

(3) In women whose abdominal walls are very obese or are the seat of eczematous conditions, colostomy, etc.

(1) All experienced surgeons are aware that the performance of vaginal plastic operations together with abdominal hysterectomy is a dangerous procedure. The alternatives are:—

(a) Perform the plastic first then some weeks later the hysterectomy.

(b) Perform the abdominal hysterectomy and some weeks later the plastic.

(c) Remove the uterus vaginally and perform the plastic procedure in its course.

This procedure avoids all the disadvantages of two operations and should replace the previous alternatives entirely.

I have used the "keel" technique as modified by Green-Armytage with complete success and no mortality. When procidentia occurs in old women in whom a functional vagina is not required, vaginal hysterectomy associated with necessary plastic work will be found quicker, safer and more certain of cure than either operations of Le Fort's type or the Manchester procedure (Donald-Fothergill). Class 3 needs no comment, as vaginal hysterectomy is almost obligatory. In this

class even in cases of malignant disease of the body, the vaginal route is preferable.

When is vaginal hysterectomy the preferable alternative?

(1) In cases of the small hard uterus (fibrosis uteri).

(2) Where fibroid tumours are small enough.

(3) In the presence of uterine polypi.

(4) Where the patient is suffering from desperate cardiac, renal or diabetic symptoms. A special indication in these diseases occurs when it is desired to terminate an early pregnancy and sterilize the patient at the same time. In broad terms, one may say that bleeding in a small mobile uterus will be best treated by vaginal hysterectomy. Discharge not capable of being suitably treated by procedures confined to the cervix and without clinical adnexitis is often a suitable indication. Pain, unless clearly limited to central dysmenorrhoea, or backache, will always require abdominal hysterectomy.

Vaginal hysterectomy has some very great advantages.

(a) Convalescence is very much better. The intestinal, gastric and respiratory functions are not interfered with, for the anaesthetic need only be pentothal, and there is no incision to interfere with respiration.

(b) Vascular lesions such as thrombosis and embolism are greatly diminished.

(c) Absence of scar means there can be no incisional hernia, no adhesions and no psychological disability resulting from the sight of the scar or thoughtless chatter about it.

(d) After vaginal hysterectomy by a satisfactory method, cystocele and vault prolapse, which are so common after abdominal hysterectomy, will rarely occur.

The disadvantages of vaginal hysterectomy are inherent in the difficulty of the choice of case, rules for which have already been given. The abdomen may have to be opened

on rare occasions to complete the hysterectomy. This has not occurred in my experience, but abdominal preparation should always be done. It is not an operation to be performed by surgeons whose fingers are untrained in their recognition of pelvic morbid anatomy. Prolapse of the tube is an occasional complication which has to be distinguished from malignant disease or granulation tissue, and may require cauterization.

It is not the purpose of this paper to discuss operative technique, but in performing vaginal hysterectomy, an operation which provides for adequate reconstruction of the pelvic floor must always be planned. I advocate the "keel" operation as practised by Green-Armytage of London. It provides for the union of the two broad ligaments in a central column or "keel" and the fixation of this anteriorly below the urethra and posteriorly to the fascia covering the front of the rectum. The utero-sacral ligaments should always be united. In this way cystocele or enterocele cannot occur later. Peritonisation of the upper surface must be as complete as possible. The uterus is best delivered anteriorly. The bladder must be closely watched during the whole operation, as must the ureters. The uterine artery should be secured on either side under direct vision, and tied twice. Silk is best avoided as it gives rise to troublesome sinuses and granulation tissue. Maingot's broad ligament clamps are invaluable.

A catheter should always be inserted for forty-eight hours and allowed to drain continuously. The patient should be nursed in the recumbent position for four days. On no account is Fowler's position to be used. The patient may be allowed up on the sixth morning. Mild infection of the bladder is common; residual urine occurs in twenty-five per cent. of cases. It requires catheterisation twice daily until it is less than three ounces. Occasional secondary haemorrhage may occur. Packing should not be practised. If too severe for posturing and sedatives to control, a bleeding vessel should be tied.

In conclusion, when a suitably planned vaginal hysterectomy is performed in the correctly chosen case, the result will be found to be highly satisfactory, there being fewer complications and a better final result than with abdominal hysterectomy.

SUMMARY.

(1) A plea has been made for the more frequent use of vaginal hysterectomy.

(2) The class of case in which it should be employed has been set out.

(3) Its advantages have been described.

(4) Reference to the essential points in operative and postoperative detail has been made.

THE RESULTS OF SURGICAL AND RADIOLOGICAL TREATMENT IN PRIMARY CARCINOMA OF THE BREAST.

Being a statistical analysis of the complete experience of six public hospitals in Melbourne during 1940-1941 (inclusive).

By ROBERT FOWLER and CYNTHIA McCALL.

Melbourne.

EXPLANATORY MEMORANDUM.

This analysis is part of a wider study being undertaken by the Victorian Cancer Registry—a bureau of clinical cancer statistics set up in 1939 by the Anti-cancer Council of Victoria in conjunction with six metropolitan hospitals, viz: The Royal Melbourne, Alfred, St. Vincent's, Prince Henry's, The Women's and Austin.

The Victorian Cancer Registry is designed to collect, organise and analyse data on the clinical attributes of cancer, particular attention being paid to the results of specific methods of treatment. During the two years under review (1940-1941) the Registry collected records of 3,650 persons suffering from cancer. Of this number, 1,800 were women, including 395 (22%) cases of primary cancer of the breast. It is this series of 395 cases that is covered in the present investigation. Case-histories for the investigation were contributed by the several hospitals roughly in proportion of two quotas from The Royal Melbourne to one from the Alfred, one from St. Vincent's and one from the other three put together.

As regards the stage of disease[1] at entry, the following distribution has been observed:

$$\text{EARLY} \begin{cases} \text{Stage I} & 53 \\ \text{Stage II} & 194 \end{cases} 247 = (62.5\%) \quad \Bigg\} \text{ 395 cases}$$

$$\text{LATE} \begin{cases} \text{Stage III} & 94 \\ \text{Stage IV} & 54 \end{cases} 148 = (37.5\%) \Bigg\} = 100\%$$

As a statistical description of this particular experience, the material presented in the accompanying tables is complete in itself and needs no further qualification. If, however, we desire to generalise, to extend our results beyond the cases actually studied — and this is the aim of most investigations of

this kind — we may do so only by inference in terms of probabilities. For example, the classified observations presented in this article constitute but small samples of large "populations"[2]. Values of a statistical measure, such as a survival rate. derived from representative samples, merely serve as estimates of the corresponding "true" measure in the parent population. These estimates will vary from sample to sample, depending upon the size of the sample and the variability of the phenomena being sampled. In the present case we are dealing with populations that are naturally stable within wide secular and geographical limits. That is to say, no radical change has occurred in the characteristics we are studying at any Australasian medical centre during the last twenty years or so. Even so, sampling errors due to the scrambled mass of circumstances known as chance must always be taken into account.

The confidence with which we may accept a sample rate as a reliable estimate of the true rate depends upon its relation to its standard error. The standard error (denoted by S.E.) supplies a measure of the degree of variability or "scatter" of a series of estimates and is readily calculated from the data. Statistical theory shows that for large samples the chance of an estimate deviating

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(1) *Criteria for defining Stage of Disease.*

EARLY { Stage I. Disease limited to breast without fixation to surrounding structures.
Stage II. Circumscribed "primary" with axillary lymph-node involvement.

LATE { Stage III. Extensive fixed and/or ulcerated "primary" with gross axillary and/or supra-clavicular lymph-node involvement.
Stage IV. Advanced local disease with distant metastases.

(2) The technical term "population" here refers to a complete universe of things or phenomena having stated characteristics in common.

"The idea of an infinite population distributed in a frequency distribution in respect of one or more characters is fundamental to all statistical work. From a limited experience, for example, of individuals of a species, or of the weather of a locality, we may obtain some idea of the infinite hypothetical population from which our sample is drawn, and so of the probable nature of future samples to which our conclusions are to be applied."

R. A. Fisher, "Statistical Methods for Research Workers," Section 11. Tenth Edition. Oliver and Boyd: Edinburgh, 1948.

from the true value by an amount exceeding 1.96 x S.E. in either the plus or minus direction is about 1 in 20. This fact enables us to replace a single estimate by the so-called 95-per-cent. confidence-range for the true value (vide Table VIII); which means that if we were to repeat the sampling procedure indefinitely (i.e., continue with the same methods of treatment in groups of patients of the same type), the succession of confidence-ranges would include the true rate nineteen times out of twenty.

A further question implicit in the data concerns the different results obtained by early surgery on the one hand and early surgery combined with X-ray therapy on the other (vide Tables V and VII). The latter method of treatment has given a 5-year-survival rate of .546 as against a rate of .489 given by surgery alone; is the difference (.057) statistically "significant" in samples of this size? The point at issue is whether a difference of this magnitude could have arisen by chance were we to assume that the contrasted methods of treatment are equally valuable.

By submitting the problem to the X^2 test (with Yates' correction for small samples) it will be possible to state in terms of probability whether such a difference is likely to have arisen by chance. The quantity X^2, which is always calculated on the basis of absolute numbers, is a measure of the discrepancy between observed results and results that might be expected on the assumption that there is no contingent association between the two classifications. The more closely the observed numbers agree with the expected numbers, the smaller the value of X^2 and the more likely is the assumption to be correct. In the present case we have a 2 x 2 classification or four-fold table (vide Table IX), in which there is one degree of freedom, since only one expected value need be calculated (in proportion to the marginal totals), the other three being written down at once by subtraction from the marginal totals. The calculated value of X^2 is .436, which, with one degree of freedom, corresponds with a probability (P) of .509. With this value of P there is no reason to suppose that our observed results indicate greater efficacy of one or other method of treatment.

TABLE I. FIVE-YEAR SURVIVORSHIP IN A SERIES OF 395 PATIENTS WITH BREAST CANCER CLASSIFIED ACCORDING TO THE STAGE OF DISEASE WHEN FIRST DIAGNOSED.

(Source: Six Public Hospitals; Melbourne, 1940-1941.)

PATIENTS' CATEGORY	TREATMENT METHOD	TOTAL	COMPLETENESS OF FOLLOW-UP		FIVE-YEAR SURVIVORS	
			Actual	Per cent.	Actual	Per cent. of traced cases.
A. TREATED	Surgery alone	92	90	98	45	50·0
EARLY	Radio-therapy	21	20	95	7	35·0
(243)	Surgery plus R.T.	130	127	98	70	55·1
	Total	243	237	97	122	51·5
B. TREATED	Surgery alone	3	3	100	0	0·0
LATE	Radio-therapy	83	83	100	15	18·1
(107)	Surgery plus R.T.	21	21	100	1	4·8
	Total	107	107	100	16	15·0
A + B. TOTAL	Surgery alone	95	93	98	45	48·4
TREATED	Radio-therapy	104	103	99	22	21·4
(350)	Surgery plus R.T.	151	148	98	71	48·0
	Total	350	344	98	138	40·1
C. INTRACTABLE (45)	No treatment Total	45	44	98	0	0·0
A + B + C. ALL PATIENTS PRESENTING (395)	Treated & untreated Total	395	388	98	138	35·6

NOTE:—Group C—INTRACTABLE—includes, besides hopeless cases, four early cases refusing treatment or suffering from gross intercurrent disease.

TABLE II. FIVE-YEAR SURVIVORSHIP IN A SERIES OF 395 PATIENTS WITH BREAST CANCER CLASSIFIED AS "PROVEN" OR "UNPROVEN" BY BIOPSY AND/OR P.M.

(Source: Six Public Hospitals; Melbourne, 1940-1941.)

PATIENTS' CATEGORY	TREATMENT METHOD	TOTAL	COMPLETENESS OF FOLLOW-UP		FIVE-YEAR SURVIVORS	
			Actual	Per cent.	Actual	Per cent. of traced cases.
DISEASE "PROVEN" (240)	Surgery alone	91	90	99	43	47·8
	Radio-therapy	10	10	100	3	30·0
	Surgery plus R.T.	120	118	98	59	50·0
	Intractable	19	19	100	0	0·0
	Total	240	237	99	105	44·3
DISEASE "UNPROVEN" (155)	Surgery alone	4	3	75	2	66·6
	Radio-therapy	94	93	99	19	20·4
	Surgery plus R.T.	31	30	97	12	40·0
	Intractable	26	25	96	0	0·0
	Total	155	151	97	33	21·9
ALL PATIENTS PRESENTING (395)	Surgery alone	95	93	98	45	48·4
	Radio-therapy	104	103	99	22	21·4
	Surgery plus R.T.	151	148	98	71	48·0
	Intractable	45	44	98	0	0·0
	Total	395	388	98	138	35·6

TABLE III. RESULTS OF EARLY TREATMENT OF 243 PATIENTS WITH BREAST CANCER
CLASSIFIED AS "PROVEN" AND "UNPROVEN".

(Source: Six Public Hospitals; Melbourne, 1940-1941.)

PATIENTS' CATEGORY	TREATMENT METHOD	TOTAL	COMPLETENESS OF FOLLOW-UP		FIVE-YEAR SURVIVORS	
			Actual	Per cent.	Actual	Per cent. of traced cases.
DISEASE	Surgery alone	89	88	99	43	48·9
PROVEN	Radio-therapy	3	3	100	1	33·3
(202)	Surgery plus R.T.	110	108	99	59	54·6
	Total	202	199	99	103	51·8
DISEASE	Surgery alone	3	2	67	2	100·0
UNPROVEN	Radio-therapy	18	17	94	6	35·3
(41)	Surgery plus R.T.	20	19	95	11	57·9
	Total	41	38	92	19	50·0
ALL PATIENTS	Surgery alone	92	90	98	·45	50·0
TREATED EARLY	Radio-therapy	21	20	95	7	35·0
(243)	Surgery plus R.T.	130	127	98	70	55·1
	Total	243	237	97	122	51·5

Table IV. RESULTS OF EARLY TREATMENT OF 189 PATIENTS HISTOLOGICALLY CLASSIFIED.

(Source: Six Public Hospitals; Melbourne, 1940-1941.)

PATIENTS' CATEGORY	TREATMENT METHOD	TOTAL	COMPLETENESS OF FOLLOW-UP		FIVE-YEAR SURVIVORS	
			Actual	Per cent.	Actual	Per cent. of traced cases.
SIMPLEX	Surgery alone	60	59	98	27	45·8
CARCINOMA	Radio-therapy	3	3	100	1	33·3
(143)	Surgery plus R.T.	80	78	97	39	50·0
	Total	143	140	99	67	47·9
DUCT	Surgery alone	7	7	100	5	71·4
CARCINOMA	Radio-therapy	—	—	—	—	—
(13)	Surgery plus R.T.	6	6	100	4	66·7
	Total	13	13	100	9	69·2
OTHER	Surgery alone	20	20	100	10	50·0
TYPES	Radio-therapy	—	—	—	—	—
(33)	Surgery plus R.T.	13	13	100	9	69·2
	Total	33	33	100	19	57·6
ALL PATIENTS	Surgery alone	87	86	92	42	48·8
HISTOLOGICALLY	Radio-therapy	3	3	100	1	33·3
CLASSIFIED	Surgery plus R.T.	99	97	98	52	53·6
(189)	Total	189	186	98	95	51·1

Appendix to Table IV.

HISTOLOGICAL CLASSIFICATION OF 446 CASES OF BREAST CANCER.

(Source: Report by A. J. Trinca, F.R.C.S., on material supplied by three public hospitals, The Royal Melbourne, Alfred and St. Vincent's.)

Histological Classification	1940-41	1946-47	Total	
			Actual	Per cent.
Simplex carcinoma	156	185	341	76·5
Mixed-type carcinoma	17	23	40	9·0
Duct carcinoma	13	17	30	6·7
Medullary carcinoma	11	6	17	3·8
Adeno carcinoma	6	6	12	2·7
Sarcoma	—	4	4	0·9
Mucoid carcinoma	—	2	2	0·4
Total	203	243*	446	100·0

*Detail: Of 203 cases, 189 were treated with a view to cure (vide Table IV); 14 cases were either intractable or obviously palliative.

TABLE VI. PROVEN BREAST CANCER: RESULTS OF TREATMENT BY RADIO-THERAPY ALONE.

(Source: Six Public Hospitals; Melbourne, 1940-1941.)

Stage of Disease	Completeness of Follow-up	No. of Traced Cases	No. of Survivors Living over					5 Year Survival Rates (%)
			1 yr.	2 yrs.	3 yrs.	4 yrs.	5 yrs.	
I	100%	1	1	1	1	1	1	
II	100%	2	1	1	0	0	0	
III	100%	6	2	2	2	2	2	
IV	100%	1	0	0	0	0	0	
Total	100%	10	4	4	3	3	3	

NOTE: Detailed treatment of 3 five-year survivors: 1 Deep X-ray Therapy (H.V.T.); 1 Radium Implant; 1 Radium Implant followed by H.V.T.

TABLE V. PROVEN BREAST CANCER: RESULTS OF TREATMENT BY SURGERY ALONE.

(Source: Six Public Hospitals; Melbourne, 1940-1941.)

Stage of Disease	Completeness of Follow-up	No. of Traced Cases	No. of Survivors Living over					5 Year Survival Rates (%)
			1 yr.	2 yrs.	3 yrs.	4 yrs.	5 yrs.	
I	100%	26	25	23	21	21	21	80·8
II	98%	62	48	41	28	26	22	35·5
III	100%	2	0	0	0	0	0	0·0
IV	—							
Total	99%	90	73	64	49	47	43	47·8

NOTE: Detailed treatment of 43 five-year survivors: 39 Radical Mastectomy; 4 Simple Mastectomy.

TABLE VII. PROVEN BREAST CANCER: RESULTS OF TREATMENT BY COMBINED SURGERY AND DEEP X-RAY THERAPY (H.V.T.)

(Source: Six Public Hospitals; Melbourne, 1940-1941.)

Stage of Disease	Completeness of Follow-up	No. of Traced Cases	No. of Survivors Living over					5 Year Survival Rates (%)
			1 yr.	2 yrs.	3 yrs.	4 yrs.	5 yrs.	
I	100%	22	22	21	21	20	20	90·9
II	98%	86	78	64	53	44	39	45·3
III	100%	10	5	1	0	0	0	0·0
IV	—							
Total	98%	118	105	86	74	64	59	50·0

NOTE: Detailed treatment of 59 five-year survivors: 52 Mastectomy followed by H.V.T.; 4 Mastectomy with Radium Implant followed by H.V.T.; 2 Mastectomy preceded and followed by H.V.T.; 1 Mastectomy preceded by H.V.T.

Table VIII. LIST OF PROBALITY STATEMENTS CONCERNING THE TRUE 5-YEAR SURVIVAL RATE FOR TEN SEPARATE GROUPINGS OF BREAST CARCINOMA PATIENTS.

PATIENTS' CLASSIFICATION (Traced patients only) (n)	Proportion at 5 Years from Entry.		Standard Error (S.E.)	95 Per cent. Confidence Range for True Proportion of Survivors (C.R.)
	Alive (p)	Dead (q)		
A. *Proven and unproven diagnoses together*				
Whole series—including intractable				
(388)	·356	·644	·024	·307–·405
All treated—early and late (344) ..	·401	·599	·026	·349–·453
Those treated early (237)	·515	·485	·032	·452–·578
Those treated late (107)	·150	·850	·035	·081–·219
B. *Microscopically proven diagnoses only*				
Whole series—including intractable				
(237)	·443	·557	·032	·380–·506
All treated—early and late (218) ..	·481	·519	·034	·414–·548
Those treated early (199)	·518	·482	·035	·449–·587
Ca. simplex treated early (140) ..	·479	·521	·042	·397–·561
Treated early by surgery and X-rays				
(108)	·546	·454	·048	·452–·640
Treated early by surgery alone (88)..	·489	·511	·053	·385–·593

NOTES:

(i) It is customary to express proportions (or frequency ratios) as fractions of unity, so that $p + q = 1$. To read these figures as percentages, move the decimal point accordingly.

(ii) Numbers in brackets indicate number of individuals (n) in the sample.

(iii) The Standard errors have been calculated from the data thus:—

$$(S.E.)^2 = \frac{p \times q}{n}$$

(iv) As used above, the term "treated", unless otherwise detailed, denotes treatment by surgical and/or radiological methods.

(v) **Conclusion:** As the result of our observations, we are confident that the "true" proportion of 5-year survivals is included in the range of values stated for each class of patients (Col. C.R.). However, there is a 5 per cent. chance in each case that our confidence is misplaced.

Table IX. CHI-SQUARE TEST OF SIGNIFICANCE AS APPLIED TO THE OBSERVED RESULTS OF TREATMENT BY SURGERY ON THE ONE HAND AND SURGERY PLUS X-RAYS ON THE OTHER. (vide Tables V and VII.)

Method of Treatment	Alive	Dead	Total
Surgery alone	43 (45·8)	45 (42·2)	88
Surgery plus X-rays	59 (56·2)	49 (51·8)	108
Total	102	94	196

NOTE: The figures in brackets are the expected frequencies: $x^2 = .436$: With one degree of freedom, $P = .509$.
Conclusion: Difference in results of treatment not significant.

EDITORIAL.

THERE WERE BRAVE MEN BEFORE AGAMEMNON.

Before Atrides men were brave:
But ah! oblivion, dark and long,
Has lock'd them in a fearless grave
For lack of consecrating song.

MY theme is simple and expresses the belief that in hoeing our busy individual rows we may neglect to cultivate the vastly rich field of our surgical past. The moral will be pointed, however imperfectly I adorn the tale, and I make no apology: one of the few outlets left to the elders is portentous or even mildly pontifical homily, but we know that the youngers gracefully accord us this privilege, despite their sturdy realism.

The life of an active surgeon is exacting and deeply absorbing, and as we become more and more versed in the humans, we become less and less so in the humanities and so merit in a decreasing degree the title of "Doctus." This may be all to the good, in that the patient is the better served by the highly skilled and specialised technician; that it is the logical result of the vast expansion of surgical knowledge since the old, simple, spacious days; and that, in any case, a nodding acquaintance with the classics and the command of an apt quotation are just so much mental lumber like the gold-headed cane and other flummery of the past. Appreciation of the polished phrase and the right word is not dead, however, but sleepeth, for when a past master of a passing epoch, like Robert Scot-Skirving, takes the field there are delighted listeners.

Be that as it may, in the writing of surgical articles, authors would do well occasionally to look back to the old masters and take a lesson, for example, from the almost studied simplicity and the measured grace of Benjamin Brodie's Clinical Lectures —

characterised, as Sir Henry Acland said, by a style graphic and artless and unforgettable.

Read his accurate epitome of the nature of "sero-cystic tumours" or take his entirely admirable advice on the clinical diagnosis of Brodie's abscess. Astley Cooper was more dramatic, as befitted his gallant tale, in his account of the famous tying of the abdominal aorta, but he prefaced it with the masterly under-statement, "Tying the aorta is an operation that no man, I think, would covet."

Many young (and not so young) writers of professional essays confuse quality with a quantity to which a ruthless blue pencil would give added pith and point. In my early graduate days I had the luck to be chastened by the kind criticism of a surgeon and an anatomist. One was death to redundancies, to the over-worked "very", to the inapt "marked", to the horrid cliche, and insisted that a critical survey could greatly shorten the average article. So it can. The anatomist's advice was to put the cherished (and secretly much admired) effusion away in a drawer for six months, when a re-reading would make it appear not so good. So it does. A terse, deftly phrased, well-punctuated article catches the eye and makes the deeper impression just as the rare paper delights the medical examiners and scores a high mark. W. J. Mayo used to observe that most of us wear $6\frac{1}{4}$ hats and that one main idea is enough for the average paper.

The remarkable exploits of our surgical forefathers in, for example, the field of aneurism leaves us with an amazed admira-

tion for their courage and prowess — but admiration (like patriotism) is not enough. We should have a just appreciation of their pioneer achievements under their heavy handicaps and allot them their rightful place in the growing pyramid of surgical endeavour.

Thoracic surgeons, for example, flushed with their brilliant successes, should reflect that 53 years ago Macewen, of Glasgow, excised a tuberculous lung under light chloroform anaesthesia. (Anaesthetists please note!) Eighteen years later, following a chance meeting in a foggy Govan street, Macewen listened to his patient addressing a meeting of the Salvation Army.

I now digress to discuss another aspect of my theme: the qualities which make for greatness in a surgeon, and which, tangibly and intangibly, create the tradition or spirit of a surgical school. High professional competence is an essential; but without humanity, by which I mean a sympathetic understanding and affection for the fortitude, frailties and foibles of mankind (our patients), most else is but the crackling of thorns under a pot. It used to be said that a patient went to Sir James Paget to have his trouble diagnosed, and to Sir William Ferguson to have it removed; a pregnant commentary on the man of philosophical reflection and the man of action. Both men live through the years, but I venture to predict that the serene Englishman of the beautiful character will endure the longer. Like truth, great is essential goodness, and it will prevail. Tradition, which is of inestimable value in a school or hospital, must be a plant of slow growth in our young countries, and it is built up by the rare men cast in a superior mould who fortunately ornament schools from time to time. Young men, unless clods, are hero-worshippers at heart, and we all owe much of our success to those before us; in an imitative handicraft, in an attitude of mind, and in other indefinable attributes. In the bustle of this machine age, in the pursuit and the acquisition of glittering prizes, we do well not to let their memories fade "for lack of consecrating song."

Let us maintain, then, at least a reasonable respect for the past: we cannot do otherwise, for we owe it too much, and it is inextricably woven into the texture of the beings we are to save us from becoming simply professional technicians with a keen eye to the main chance. It is perhaps arrogant to say this, but a survey of present times and tendencies raises uneasy qualms that we may be declining from our high calling and following the false path of easy material success. The hard way of the past was tough, but it was a crucible which moulded, mellowed and refined. Respect for our traditions offers salvation to us all, for our profession, like our countries, is essentially sound at heart. For the older ones of us there is an additional chance of spiritual redemption in the cultivation of a generous attitude to our younger brethren. This attitude, happily, already exists in good measure, but should be maintained and extended not only in our private and hospital relations, but also in the conduct of the affairs of this College, for the cause of Surgery profits by the enthusiasm, fire and enterprise of our "young men who shall see visions."

F. GORDON BELL.

PLASMA CELL MASTITIS.

A REPORT OF TWO CASES.

By NOEL C. NEWTON.

Sydney.

SINCE the first description of plasma cell mastitis 17 years ago, I have been able to find reports of only 46 cases, mostly in the American literature. In view of the little that is known about the aetiology of this condition and because of its similarity to carcinoma, I wish to report two new cases, both of which present a feature not previously described.

HISTORICAL SURVEY.

The term "Plasma Cell Mastitis" was first used by Ewing to describe a benign inflammatory disease occurring in the non-lactating breast. The first published report using this term was by Cheatle and Cutler (1931) in their book, "Tumours of the Breast" — based on their observation of cases at the Memorial Hospital for Cancer and Allied Diseases, New York. Adair (1933) described 10 cases which he had observed at the same hospital. Further reports appear in American literature by Rodman and Ingleby (1939), Miller (1939), Groman and Dockerly (1941), Payne, Strauss and Glassen (1943), Parsons, Henthorne and Clarke (1944), Gaston (1947). As far as I am able to determine, there is no report of this condition in the Australian literature.

THE CLINICAL PICTURE.

Plasma cell mastitis is of importance because of the frequency with which it is mistaken for carcinoma. This also occurred in the two cases herein reported. The age of the patients reported by Adair (1933) varies from 29 to 44 years; average, 36 years. Other reports show a similar variation in age groups. The patients herein reported were 58 and 62 years respectively, both being somewhat older than most reported cases.

The disease in all previously recorded cases has invariably occurred in multiparous women some years after cessation of lactation. Both cases herein recorded were in women who had never been pregnant.

The story is usually one which involves two phases, an acute inflammatory and a later residual phase. The first is often mistaken for a breast inflammation or abscess, and the second for carcinoma.

The acute phase is one during which a portion of the breast, commonly an area near the nipple, is painful and shows heat, tenderness and some redness. This phase is usually not severe and may often be hardly noticeable; certainly not a prominent feature in the patient's mind when examined subsequently. This acute stage is short-lived and after a variable period of weeks or months the second or residual phase appears, in which a lump, usually painless and not tender, becomes apparent. It is commonly at this stage that the patient seeks medical advice.

The tumour, situated in most instances near the nipple, is hard and ill-defined, and instead shows attachment to the skin and in some cases retraction of the nipple with *peau d'orange* of overlying skin. Axillary nodes are commonly palpably enlarged. There may be a history of discharge of creamy or watery material from the nipple; bloody discharge is recorded in only one case in the literature, by Gaston (1947).

Diagnosis.

This is extremely difficult, as the tumour simulates carcinoma to a nicety. However, in cases which have a history of an acute phase followed by the residual stage, it should be suspected. Both cases here recorded give a history which should have made us at least suspicious.

Etiology.

The etiology is still a matter of conjecture and the role of plasma cells in inflammatory lesions still not well known. The various authors reporting such cases would seem to be of the opinion that, although it is possible that bacterial infection plays a part in the

production of this reaction, it is more probable that it is a reaction of the tissues to an irritant of a chemical rather than a bacterial nature.

It is suggested that rupture of some of the dilated ducts leads to extravasation of irritating material into the stroma of the breast, giving rise to this specific reaction.

Ewing would incriminate decomposing fatty material; Rodman and Ingleby suggest from their experiments of injecting pancreatized milk into the breasts of rabbits, that "milk acted on by enzymes is one way in which the lesion can be produced." Warren Cole (1944) emphasises the resemblance to traumatic fat necrosis in certain cases and suggests that fat necrosis may be an important factor in both conditions. In traumatic fat necrosis trauma is the initial trigger mechanism which is lacking in plasma cell mastitis. He suggests that while in traumatic fat necrosis the fatty material is derived from interstitial tissue, in plasma cell mastitis it is derived from within the duct.

Dodson, observing squamous metaplasia in the large lactiferous ducts in one of these cases, and remarking on the proximity to the nipple of most tumours reported, and knowing the efficacy of keratin in stimulating foreign body reaction, suggests that squamous metaplasia may have been the initial lesion in one of these cases.
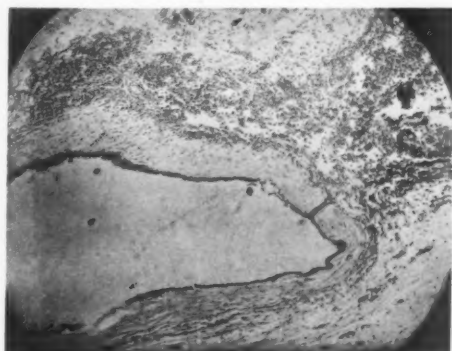
FIGURE I. Low power field showing dilatation of duct with marked periductular round cell infiltration. x 70.

Pathology.

Macroscopically the tumours are yellowish brown in colour, often with a centre resembling an abscess cavity and containing liquid material unlike actual pus, but of a colour resembling butter. In many cases the remainder of the breast is the site of a diffuse comedo mastitis.

On microscopic examination, the following features are manifest:

1. Massive infiltration of glandular and interstitial tissue with plasma cells.

2. The presence of many foreign - body giant cells often making the diagnosis from tuberculosis difficult. These giant cells are reported often to surround clear areas from which fatty material has been dissolved during preparation of the sections.
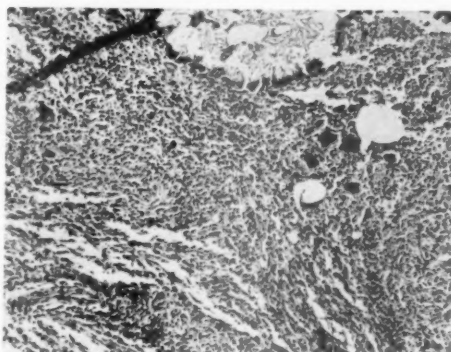

FIGURE II. Microscopic appearance of typical area as seen in Case 1, showing excessive round cell infiltration with abundant plasma cells. Giant cells are seen near space from which alcohol soluble substance has been dissolved out. x 150.

CASE REPORTS.

Case 1.

An unmarried woman, 62 years old, was admitted to hospital on 15/7/47. She complained that eight weeks previously she had noticed a lump near her left nipple. It was mildly painful and she consulted her doctor, who advised painting it with iodine. The pain disappeared, but the lump persisted, and she was advised to have an operation. There had been no discharge from the nipple.

She had never been pregnant and menopause had occurred when she was 48 years old.

Examination revealed a hard lump about one inch in diameter in the lower lateral quadrant of the left breast, quite close to the nipple. There was attachment to the skin over the lump which felt quite superficial. The skin over it was pink in colour. Both breasts had a shotty, granular feel quite characteristic of hormonal mastopathy.

Preoperative diagnosis of carcinoma was made and a left radical mastectomy was performed.

The pathologist's report by Dr. L. F. Dodson was:

"There is a hard mass one inch in diameter beneath the skin adjacent to the nipple. Incision here shows a plaque of brownish tissue flecked with yellow immediately underlying the skin and shading off into the subcutaneous fat. The larger ducts close to the nipple are distended with a greyish material of buttery consistency. A lesser degree of this change is present in the breast tissue proper.

Microscopical Examination.

"The breast tissue contains numerous small cysts filled with a pale eosinophilic staining substance. The surrounding fibrous tissue is infiltrated by lymphocytes. One of the lactiferous ducts immediately below the nipple is partially lined by squamous epithelium and distended by a secretion which contains at least some keratin. Sections from the indurated area show numerous foreign body giant cells in relation to lipoid spaces, and a marked infiltration of cells, predominantly lymphocytes, plasma cells and macrophages. In one or two areas polymorphs are numerous. This lesion has all the features of a foreign body reaction, due almost certainly to rupture of a large lactiferous duct and discharge of its contents into the breast tissue proper."
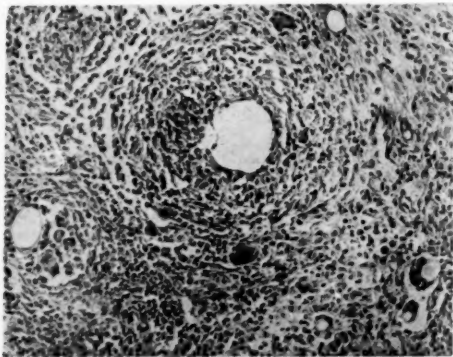
FIGURE III. Microscopic appearance of typical area as seen in Case 2, showing similar features to Figure II. x 150.

Case 2.

A married woman, 58 years old, was admitted to hospital on 25/5/47. She complained that eight weeks previously she consulted her doctor because of retraction of her right nipple. She had no pain and had noticed no lump. Her doctor pointed out a lump near the nipple which he called a "small abscess" and said this was the cause of the retraction. She was given a "black ointment" to apply and advised to foment the area, which she did assiduously. The lump increased in size, became painful, and the skin over it red. She was then advised to enter hospital. There was no history of trauma and no discharge from the nipple. The patient was married, but had never been pregnant. Menopause had occurred nine years previously.

Examination revealed both breasts to be of equal size, the right nipple being retracted. There was a hard tumour about two inches in diameter in the inferior part of the breast immediately adjacent to the nipple. It had an ill-defined edge and was attached to the overlying skin which showed obvious reddening. There was a softness over the centre of the tumour. Both breasts were granular and obviously the site of hormonal mastopathy. Both axillae were free of palpable glands.
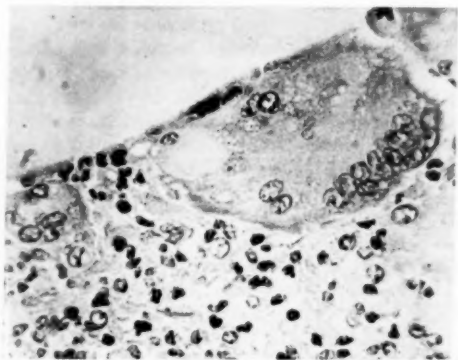

FIGURE IV. Microscopic appearance of giant cell at the border of a space from which fatty substance has been dissolved. x 600.

A preoperative diagnosis was difficult and it was decided that the tumour had features of neoplasm and inflammation. It was decided to perform a simple mastectomy through an elliptical incision which could be extended in either direction to complete a radical mastectomy, should this be necessary after incising the tumour, and, if necessary, having it examined by frozen section. This was done and both observation and frozen section left doubt as to diagnosis, so that a radical mastectomy was completed.

Later the pathologist's report by Dr. L. F. Dodson was as follows:

"Beneath and adjacent to the nipple there is an ill-defined nodule of greyish yellow tissue. The breast tissue proper shows dilated acini from which plugs of greasy material could be expressed.

Microscopical Examination.

"The nodule shows the features of a reaction to a foreign body. It is very cellular, containing numerous foreign body giant cells in relation to spaces in the section from which an alcohol soluble substance has been dissolved. Many macrophages, polymorphs, lymphocytes and plasma cells are also present. The remainder of the breast shows cystic hyperplasia and many acini show heaping up of lining cells (resembling carcinoma), giving the comedo appearance seen on macroscopic examination. This lesion, I think, has resulted from the material in the dilated ducts gaining access to the

breast stroma, probably due to trauma. Dr. A. H. Tebbutt agrees with the above opinion. Axillary lymph node shows sinus catarrh."

DISCUSSION.

Unlike any previous case recorded, the two cases occurred in nulliparous women and, like most cases recorded, underwent an unnecessary radical mastectomy.

The history in both these cases demonstrated an early mild acute phase. Case 2 would have appeared still to manifest features characteristic of this stage in its more severe form when operation was undertaken. In Case 1 this phase was mild and it had progressed to the second stage when treatment was carried out.

Both patients showed evidence of diffuse changes of hormonal mastopathy in both breasts.

It would appear that if the diagnosis can be made clinically, or after biopsy in doubtful cases, simple mastectomy is the treatment of choice.

Gaston (1947) goes so far as to recommend biopsy and immediate microscopic examination of the frozen section material in all breast tumours, including those in which the clinical findings are characteristic of malignancy. This, however, would seem to jeopardise the chances of many patients with carcinoma in an endeavour to avoid performing unnecessary radical mastectomy on a few patients with plasma cell mastitis.

SUMMARY.

1. A short historical survey of plasma cell mastitis is given.

2. The clinical picture is described.

3. The possible aetiology is discussed and the typical pathology described.

4. Two cases considered to have had plasma cell mastitis are reported.

5. The best treatment would appear to be simple mastectomy when a diagnosis is made.

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THROMBOSIS OF THE ULNAR ARTERY.

By L. G. TEECE.

Sydney.

THE purpose of this communication is to describe a condition, which constitutes a definite recognizable clinical entity, namely, a localized thrombosis of the ulnar artery in the palm of the hand due to trauma.

The artery with the ulnar nerve lying on its inner side passes into the palm of the hand superficial to the anterior annular ligament and lateral to the pisiform bone. It curves across the palm covered only by skin and palmar fascia to join a branch of the radial artery to form the superficial palmar arch. The superficial branch of the ulnar nerve lies along the inner side of the artery and divides into two digital branches, one for the inner side of the little finger and the other for the adjacent sides of the ring and little fingers. The thrombosis under consideration affects the ulnar vessels just at a level where the accompanying superficial branch of the ulnar nerve divides into its two digital branches. At this point the artery emerges from under cover of the palmaris brevis muscle and is covered only by the skin and the relatively thin medial part of the palmar fascia. It is therefore in this part of its course especially vulnerable to injury.

A localized thrombosis in this situation is always due to trauma, either an individual blow or a crushing force applied to the palm. It produces a definite group of symptoms and signs unmistakable to anyone familiar with the condition. There is a localized tender spot one inch distal to the pisiform bone and somewhat lateral so that the tender point is in line with the cleft between the ring and little fingers. It is the complete constancy of the situation of this localized tender point that is so characteristic, inasmuch as the rest of the palm is entirely free from tenderness. The tenderness is sufficient to prevent the patient engaging in manual labour.

This one symptom combined with a history of injury is sufficient to establish the diagnosis. However, additional signs are usually, but not invariably, present. At the point of tenderness there is usually a small,

firm, palpable nodule. There are generally signs of involvement of the superficial branch of the ulnar nerve. There will of course be no motor palsy or trophic change, but there will be disturbance of sensation ranging from subjective sensations to numbness or pins and needles to complete loss of sensation to light touch in the distribution of this nerve to the ring and little fingers.

I have now seen and operated on five of these cases. In the first patient, the operation was frankly exploratory and the correct diagnosis was not made preoperatively. Rather I considered it probable that I was dealing with a neuroma of the ulnar nerve. I shall quote the report of but one typical case, inasmuch as all are so similar.

The patient, H.R.B., age 30, was a storeman and packer. On 4/5/48 his right hand was jammed between two cases. He felt pain in the palm of his hand, but carried on with his work for three days. Four days after the injury he noticed a lump in the palm of the hand and numbness of the ring and little fingers.

On examination of the right hand there was no muscle wasting and no trophic change. There was no paralysis of any of the intrinsic muscles and full movements of all the digits and of the wrist were present. There was a small, rounded, palpable nodule about ¼ inch in diameter in the palm situated one inch distal and slightly lateral to the pisiform bone. It could be moved either proximally or distally, but not from side to side, and was tender to pressure. The right ring and little fingers were colder than normal and there was loss of sensation to light touch in the distribution of the superficial branch of the ulnar nerve to these fingers.

Operation was performed on 22/6/48. The nodule, previously palpable, was found to consist of the thrombosed ulnar artery and its venae comites. About one inch of the vessels was excised. The ulnar nerve appeared normal to naked eye examination. The specimen was examined by Dr. A. H. Tebbutt, who reported that there were two blood vessels with greatly thickened walls filled with clot. He considered the condition was the result of a thrombosis or possibly of an anterio-venous aneurysm. Convalescence was uneventful. The patient returned to his work on 9/8/48. At that date tenderness had disappeared. Sensation was returning to the ring and little fingers, but was not completely restored.

Treatment of these patients, once the diagnosis is established, is of course sure and

simple. It merely consists of excision of the thrombosed section of the vessels. The symptoms indicative of pressure on the ulnar nerve vary and in some cases are absent.

The one point I wish to stress is that the history of trauma followed by the presence of the definite, accurately localized tender spot is of itself alone sufficient to make the diagnosis certain even in the absence of a palpable nodule and of signs of involvement of the ulnar nerve.

My reason for publishing this report is that it records, so far as I know, a hitherto undescribed clinical entity which occurs with sufficient frequency to make its recognition by practising surgeons desirable.

SUPRAPUBIC SLING OPERATION FOR STRESS INCONTINENCE IN THE FEMALE.

By R. J. SILVERTON

Sydney

THE recent interest in the suprapubic approach, and retropubic execution, in an operation for cure of stress incontinence in the female, is a reversion to the early methods of Goebbel (1910), Frangenheim (1914), and Stoeckel (1917). Since that era, and until recently, the accent was on various vaginal operations, in which, in the anterior repair, the important thing in connection with incontinence is to re-form the torn or attentuated pubo-cervical fascia, so that a firm hammock exists to support the proximal portion of the urethra and the vesical trigone. Without this normal support, the latter structures sag or herniate through the deficient fascia, and form a urethrocele and cystocele respectively.

Studdiford (1945), who has taken a prominent part in recent work from the vaginal aspect, says that the sagging trigone, under the continual assaults of intra-abdominal pressure, tugs, by the muscular insertion of its apex in the posterior urethra, on the floor of the internal meatus, and weakens the efficiency of the internal sphincter. I think this is a very sound explanation. During cystoscopy under local analgesia in normal patients, if one directs the patient to cough, the floor of the internal meatus descends sharply, and this is no doubt due to the transmission of a sudden increase of pressure to the apex of the muscular trigone.

Very few workers at the present time consider laxity of the urethral muscles themselves of primary importance, and operations directed towards repair of these muscles have not given sufficient satisfaction. (Kelly — external approach, and Macky — intra-vesical tautening).

One group of recent workers regard descent of the bladder neck as the essential lesion; but I cannot understand, anatomically or physiologically, how this factor alone can operate. I do, however, see how a cystocele allows trigonal tugging on the floor of the internal meatus. This is normally the first movement in ordinary urination. In the stress type of incontinence, once a little urine enters a flaccid urethra, bulging downward to form a urethrocele, there is not possible any tonicity of the widely dispersed external sphincter for a final, voluntary attempt to retain the urine. It is very likely that the stresses of former labours have not actually damaged the urethral and trigonal muscles, but that the latter have bulged more and more over the years, as the normally broad, firm hammock of pubo-cervical fascia has become more and more incompetent. They should regain some, or all, of their tone when this hammock is repaired.

This actually happens in gynaecological practice and most workers in this sphere find that up to 75 per cent. of cases of stress incontinence respond to a satisfactory anterior repair.

In 25 per cent. or so of cases, however, the distressing leakage persists, ruins social life, and makes even private life a misery when of severe grade. It is in such cases that an aponeurotic sling, suspended from above, is expected to cure the patient.

Aldridge (1942) and Studdiford (1945) combined a sling from above with their anterior vaginal repair. They break through the pubo-cervical fascia, behind the os pubis, a little to each side of the mid-line, to enter the pre-vesical space. With long curved forceps they bring down, on each side, a strap of previously prepared aponeurosis, raised transversely from the rectus and external oblique, and suture the straps to each other under the urethra. In this way they buttress the under surface of the proximal portion of the urethra, in case the repaired pubo-cervical fascia is so damaged that it gives way later, even though satisfactorily repaired at the time. This form of sling, however, does not lift up and angulate the urethra in the marked manner of the purely intra-pelvic sling, applied suprapubically. Moreover, it does seem a pity to force a large hole through

the antero-medial portion of the pubo-cervical fascia with the forefinger, when at the same time one is endeavouring to restore the integrity of this supporting hammock.

Finally, any combined vaginal and supra-pubic operation of this type is long and tedious. It seems better for the gynaecologist to perform an efficient repair of the pelvic floor, with special care of the supporting structures of the urethra and bladder, and wait to see how the patient fares. She will do well in something on the way to three-quarters of all cases. If urinary continence does not remain satisfactory, it is time to play the trump card of the purely suprapubic sling, which acts entirely intra-pelvically and so far seems to be extremely satisfactory, even in cases failing after all types of purely vaginal plastic.

In 1910 Goebell used the pyramidales muscles only, dissecting each up to its pubic origin, and passing each down under the intra-pelvic portion of the urethra, where they were sutured together. I am sure that in many cases, particularly in fat women, they would not reach far enough to allow this.

In 1914 Frangenheim made up for this defective factor by leaving the freed pyra-midales attached to straps of rectus aponeurosis, thus supplying more length. In 1917 Stoeckel combined the latter operation with a vaginal plastic, which included plica-tion of muscles about the vesical neck.

Terence Millin and Charles Read (1948) collaborated in a paper describing the forma-tion of very long transverse straps from the rectus and external oblique aponeuroses, pedicled out near the anterior superior iliac spines, at alternate ends. The incision is very long, with much undermining of both fat and aponeurosis. Formation of the straps is tedious, and final closure of the enormous transverse aponeurotic gap across the belly wall is difficult, and develops great tension.

McIntosh Marshall (1948) described a similar operation, but with important dif-ferences in the deep or retro-pubic stage. Millin and Read pass the straps under the urethra by means of a special rather sharp-pointed forceps. Marshall uses a much safer instrument, a wide, blunt and strong type

of giant aneurism needle. This carries the right-hand strap by means of a stay suture on its tip. But it does not simply pass under the urethra alone; it first of all pierces the right pubo-vesical ligament (a tight, rigid band), then goes under the urethra, and finally up through the opposite pubo-vesical ligament. A little nick in each ligament with a tiny-bladed long tonsillectomy knife helps this manoeuvre. The suture is dis-engaged from the strap-carrier, and the stay-suture attached to the left-hand strap is now drawn back to the right along the same route, bringing its strap with it. By this means the portion of a strap passing under the urethra is broad and horizontal, not narrow and vertically angulated, even if the strap is taken from the medial edge of the rectus sheath (with a mid-line incision), the method I favour because of its simplicity.

Marshall has designed an excellent urethra-holding forceps, with a ring-shaped end for surrounding the urethra (and its contained Foley catheter), and lifting the mobile intra-pelvic urethra away from the vaginal wall.

Both papers advised passage of the trans-verse straps through the lateral part of the rectus muscle, on their way down to the depths, and up on the other side through the medial part of the opposite rectus. If long enough the straps are finally sutured to each other.

In this paper I shall give the notes of two cases. In the first, a thin woman but an extremely severe case of incontinence, I fol-lowed the Millin-Read method of strap-formation, but used Marshall's instruments and method of strap-passage. In the second patient, a very large and grossly fat subject, I abandoned the transverse incision for a mid-line one, and formed a single strap from the medial edge of the right rectus sheath, passing it through the pubo-vesical ligaments and under the urethra by the Marshall method. Finally, this strap was brought through the left rectus near the mid-line, and also through the sheath to which it was sutured with silk. This wound, in a far less favourable individual, healed completely with far less after-drainage from the pre-vesical and other tissue spaces, than did the wound in the thin woman who had so much under-mining of fat and aponeuroses.

It is claimed by Millin and Read that their transverse straps form a flat, hammock-like sling under the urethra. But Marshall by utilizing the pubo-vesical ligaments, attains this effect very noticeably at the most vital part, namely, under the urethra. Moreover, it is practically certain that the sling becomes finally adherent to these strong ligaments later on, forming a rigid, firm sling for the urethra. Furthermore, in the Marshall method, the blunt strap-carrier keeps away from the lateral wall of the urethra, with its venous plexus.

In the initial approach to the urethra, the veins running longitudinally in the areolar tissue at the bottom of the pre-vesical space are doubly ligated and tied. Deeper still, some veins lying in a fascial layer, stretching from one pubo-vesical ligament to the other, and similarly treated, so that this fascial diaphragm can be opened up and the urethra seen and grasped.

Marshall holds his ring forceps elevating the urethra in his left hand, while he passes the strap-carrier with his right. I prefer to give the forceps to an assistant to hold up, while I control passage of the strap-carrier with the forefinger of an extra-gloved left hand in the vagina. One tries to avoid perforation of the vagina on one hand or of the urethra or bladder on the other.

In order to avoid angulation, and therefore ischaemia, of the single longitudinal strap at its muscular pedicle on the pubis, I had intended in my second case to pass it first of all a little upwards and outwards, and then pierce its own rectus sheath and belly, before descending into the pre-vesical space. I make the mistake, however, of not taking my abdominal incision right up to or even a little beyond the umbilicus. Consequently my strap was a little short for the intended route, and I had to let it drop down straight from its right pubic origin. However, it did not give at all the appearance of being angulated at this point and since the patient has done well it is probably still quite alive.

All three modern authors quoted claim an action on the sling because of its passage through both recti; they also claim elasticity of the pedicle, rising broadly from muscle on each side. They consider that when the patient sits and leans forward in urinating the sling loosens, and the reverse when she stands straight, or when she bulges out her abdominal wall under the impact of any stress. I feel sure that these supposed benefits are illusory. From an experience of a large number of secondary cystotomies and similar operations, I feel sure that the straps become cemented firmly by fibrosis in the pre-vesical space, till they finally become rigid and immovable.

My two patients are cured; the first one was treated six months ago, and the second only recently. One hopes that this benefit will last.

Millin, Read and Marshall quote cures lasting several years now. How does the suprapubic sling achieve this result?

We have seen that the factors of elasticity of pedicle, the transmission of rectus muscle action are extremely doubtful. The urethra is certainly supported on its vaginal aspect, but the trigone is not, therefore preliminary vaginal repair of the damaged pubo-cervical fascia is of primary importance, unless there is no pelvic floor laxity (menopausal cases in nullipara, for instance).

It is considered by some authors that the essential factor in stress incontinence is a pathological descent of the bladder neck. From my own visual observation of the tightly-pulled sling I did not notice any appreciable elevation of the region of the internal meatus. The sling slipped a little way along the urethra and stayed at a point about 1 to 1.5 centimetres along the canal from the internal meatus. It was obvious that this rendered the long axis of this short, proximal part of the tube, in relation to the lower part of the bladder, almost tangential. Were the bladder full (spherical), the urethral axis would become almost fully tangential and an acute angle would become almost closed. It is easy to see that with increasing fulness of the bladder or under conditions of sudden strain where the organ is driven down a little the tangential effect would be increased, with a valvular action favouring continence of urine. Furthermore, there is angulation of the urethra itself, where the strap lies, for what this factor may be thought to be worth.

CASE REPORTS.

Case 1.

Mrs. H.B.K., aged 41, suffered from a very severe form of stress incontinence since the birth of her only child four years before she saw me in September, 1948. Ten months before seeing me she had had a vaginal plastic operation with a Kennedy type of repair for the urethral incontinence. Some improvement occurred, but she complained that she still had to wear pads all the time, day as well as night. The urine used to escape even under slight stress, or sometimes, as when lying quietly in bed under no stress at all, so life was rather a misery. She had no increased frequency or difficulty in urination and though there was an itchy feeling after the act there was no pyuria or infection.

I filled the bladder with permanganate lotion and asked the patient to cough while recumbent; coughing caused escape of the urine, but this could be controlled by Bonney's method of placing the tips of two fingers on each side of the urethra, and pressing upwards to support the region of the proximal urethra and bladder neck. The indication was therefore clear to perform a suprapubic operation for intra-pelvic support of these parts.

In November, 1948, this operation was performed, using a generous transverse incision of the Pfannenstiel type and raising two long transverse straps from the rectus and external oblique aponeuroses as described by Millin and Read. After this beginning I adopted the method of McIntosh Marshall for tunnelling under the urethra and passing the straps. This has been explained above. Each strap was passed down through the outer part of the rectus belly on its own side and up through the medial part of the opposite rectus.

Though each strap was only a centimetre or so in width, retraction of the undermined aponeuroses caused an enormous transverse gap (4 to 5 centimetres) to develop and this was only brought together with great tension and difficulty at the end of the operation.

Although Millin counsels removal of the Foley catheter in five days, I preferred to leave it for ten days, when the wound was healed firmly enough to allow the patient to sit up to urinate. Often there is difficulty in this act at first, and catheterization is needed or reinsertion of the catheter. I wished to avoid this so I retained the catheter for ten days, keeping the patient on streptomycin and penicillin the while, so as to combat any possible infection.

The patient had no real difficulty in urination after removal of the catheter. I had drawn the straps moderately tight only, though the temptation is to overdo this part of the technique; it is certainly a good thing not to underdo it.

In spite of a bacillus coli infection discovered early in her post-hospital convalescence and a further attack three months later, with some scalding and very slight frequency, she did well, leaving off her pads and only wetting the bed once in the first three weeks after going home. General im-
provement in her continence was noticed in hospital as soon as the catheter was removed, and she has ever since then described herself as "95 per cent. cured."

Case 2.

Mrs. M.J., aged 50.

This woman suffered from a severe degree of stress incontinence for ten years before seeing me in April, 1949. She had had three children, with no difficulty in labour or puerperium. The youngest child was aged 20.

A repair operation for cystocele, with careful restitution of the pubo-cervical fascia, had been done four years earlier by her gynaecologist, who sent her to me recently with a request to consider indications for a suprapubic sling operation. Her incontinence had relapsed severely, though it had improved for some months after the vaginal repair. She now lost urine under any slight stress when up, and when in bed quite severe leakage occurred when she raised herself into the sitting position or coughed while lying down.

Her urine was sterile and nothing abnormal was seen on endoscopy of the bladder and urethra. Bonney's test was positive.

I decided to avoid the tremendous transverse incision with undermining of fat and aponeuroses and made a mid-line incision from the pubis up to one inch below the umbilicus. This woman was grossly fat and large, and I should have gone right up to the umbilicus or beyond it to get a longer strap, for the single one I raised from the medial margin of the right rectus sheath was not long enough in such a fat subject to achieve my intention.

This was to take the strap, pedicled on muscle tissue arising from the top of the os pubis, and pass it through the sheath and belly of its own rectus muscle at a point a little upwards and laterally from its origin, then through the right pubo-vesical ligament, under the urethra, through the left ligament, and finally up through the belly and sheath of the opposite rectus, to be sutured with silk to the sheath as it emerged. I was forced to abandon only the first part of this programme and drop the strap directly down into the pre-vesical space. Except that the very doubtful advantage of attachment to the active rectus on the right side is lost there is no disadvantage in this, for as I observed there is no visual impression of kinking of the strap as it dives down near its origin, with risk of ischaemia and necrosis. The narrowness and deepness of the loop do not matter, for with the Marshall technique the part of the strap under the urethra, being supported by the rigid pubo-vesical ligaments, is flattened out.

Passage of the strap-carrier in this obese patient was very difficult, and in spite of the controlling left forefinger in the vagina I made a slight wound, evidently in the bladder-neck, for a little urine welled up, and also escaped through the tissue drain for a week or so after the operation. I therefore kept the patient on streptomycin and

penicillin for two weeks, and retained the 18F Foley catheter for a like period. By this means the little bladder injury healed and she declared herself cured of her incontinence at once and left hospital two days later with a wound that healed rapidly in spite of the urinary escape and the gross sweating folds of her lower abdominal skin.

I think that the avoidance of undermining of fat is a great help in the healing of such cases as this. I hope her improvement is maintained, but I have reported the case at this early stage as the matter is of present interest.

CONCLUSIONS.

The suprapubic sling operation for stress incontinence in the female is a very useful procedure in treating those patients not cured by an efficient gynaecological repair. It is a revival of an earlier operation, and is improved by McIntosh Marshall's idea of passing the straps through each pubo-vesical ligament as well as under the intra-pelvic urethra.

Marshall's strap-carrier and urethra-holding forceps are excellent instruments, but the passage of the straps should be controlled by a vaginal left forefinger.

It is probable that the elasticity of the pedicle and the effect of passage of straps through the recti are purely temporary phenomena, and that continence is achieved by lifting up the proximal portion of the intra-pelvic urethra so that it lies tangentially to the floor of the bladder, with consequent valve-action on filling or stress.

The writer deprecates the long transverse incisions used by Millin, Read and Marshall, and thinks that a single long strap, raised from the medial edge of the right rectus will achieve a good result, particularly if it passes through each pubo-vesical ligament, and if possible through each rectus belly and sheath.

The clinical and operative details of two recent successful cases are given.

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CASE REPORTS.

NEURILEMOMA (SCHWANNOMA) OF THE DUODENUM.

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Sydney.

A NEURILEMOMA of the duodenum is a neoplasm arising from the cells of Schwann of the submucous or myenteric nerve plexus.

INCIDENCE.

In contradistinction to their occurrence in the stomach, neurilemomata of the duodenum are extremely rare. Sjörall (1937) in 31,331 autopsies found only two cases of neurilemomata of the small intestine, neither of which were in the duodenum. Weinberger and Palteuf (1948), in a survey of tumours of the small intestine in a large American hospital over 40 years, saw no benign tumours of the duodenum. Hoffman and Grayzel (1945) reviewed 64,300 surgical specimens and 4,480 autopsies and found 33 benign tumours of the small intestine, of which only 14 were duodenal and only one of these had fibroma-like characteristics. In a total of 66 benign tumours of the duodenum collected by various authors (Balfour, 1929), (Golden, 1928), (Hoffman 1945), (Raiford, 1932), and (Rankin, 1933) there was only one so-called fibroma.

REPORT OF CASE.

The patient, a married woman aged 60 years, had suffered from recurring attacks of illness for the previous 15 years. These attacks were characterised by sudden weakness, breathlessness, and extreme pallor. They were sudden in onset and were accompanied by vague, generalised abdominal pain. Recurring every three or four months, the attacks would last from two to three days. It would then be a week before the patient felt well again.

In the six months prior to operation, the attacks became more frequent, occurring every two or three weeks, and the patient now felt constantly weak and tired. The abdominal pain became more severe and was cramp-like in character, and was now localised to the right hypochondrium. There was no vomiting or diarrhoea.

At the commencement of the illness, blood counts had been performed and purported to show a macrocytic anaemia. Tests on the faeces had not revealed occult blood. A test meal showed a normal acid curve. Radiological examination of the gastro-intestinal tract, the gall bladder, and the renal tract revealed no abnormalities. During the next 14 years a few blood counts only were performed, and always showed the picture of a pernicious anaemia. The faeces were several times examined for occult blood, but, strangely enough, none was ever found. Presumably the tests were always done between attacks.

The diagnosis of pernicious anaemia was made, and the patient was treated vigorously over these years by liver injections and iron by mouth. She stated that her faeces were thus always black, so that she noticed no difference in their colour during an attack.

Two weeks prior to operation, further medical advice was obtained. The only abnormality discovered was that the patient was obviously anaemic. Her tongue was normal in appearance. Abdominal examination revealed no abnormal findings. A full blood count showed 2,500,000 red cells per cubic millimetre with a haemoglobin value of 54 per cent., giving a colour index of 1.1. Macrocytes were present, but there were no nucleated red cells or reticulocytes. The blood was Rh negative and it belonged to group O. There was nothing significant in the white cell count. Again the faeces did not contain occult blood.

Three litres of stored blood restored the red blood cells to 5,270,000 per cubic millimetre with a haemoglobin value of 89 per cent., and her general condition improved.

A week later, however, a further attack of pain ensued, followed by fainting. A blood count revealed that there were only 2,120,000 red cells per cubic millimetre with a haemoglobin value of 42 per cent. This time the patient had not been taking iron,
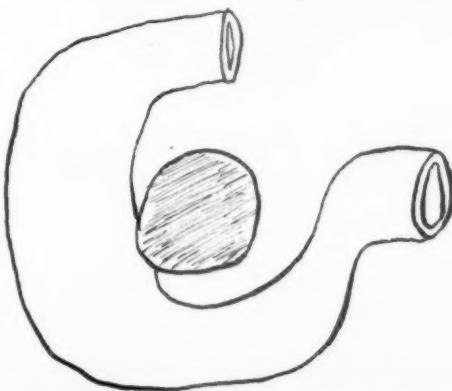

FIGURE I. Drawing showing the position of the tumour.

and the tarry stool of a severe melaena was now apparent. A Ryle's tube was passed, and it was seen that there was no blood in the stomach.

It was obvious, therefore, that she had a haemorrhage into the bowel lumen. Further transfusions were given and the blood count brought back to normal. The intestinal canal was now investigated by barium meal and enema. The stomach and duodenum were normal. The enema purported to show a constant, smooth, filling defect on the medial of the caecum.

In view of these findings, exploration of the abdomen was performed through a right para-umbilical incision. The caecum, however, was normal, as were also the rest of the large bowel, the jejunum, and the ileum. There was, however, a hard, lobulated swelling behind the right port'on of the transverse colon in the retroperitoneal tissues. The peritoneum in front of the third part of the duodenum was divided and by blunt dissection the tumour was delivered through this incision. Easily separated from its surroundings, it was seen to be attached to the med'al wall of the duodenum just above the junction of the second and third portions (Figure I). The tumour projected very little into the duodenal lumen and had burrowed into the head of the pancreas. It was removed together with a cuff of duodenal wall around its attachment. The opening in the duodenum was sutured in two layers. The posterior peritoneum was then sutured and a drain placed down to it and brought out through a stab wound in the abdominal wall. The abdominal incision was then sutured in layers in the usual manner.

FIGURE II. Photograph of the specimen.

Pathology of the specimen (Figure II).

The tumour was well encapsulated, lobulated, and rounded, measuring four centimetres in diameter. The surface projecting into the duodenal lumen was ulcerated. On being cut, the exposed surface was seen to be of whorled appearance and greyish white in colour.

Microscopy (Figure III) showed the structure of a fibroma with, in places, a palisade arrangement of the cells. Differential staining by Van Gieson's stain revealed that the cells were not muscle cells, but were collagen.

The diagnosis of neurilemoma was based on the palisade arrangement of some of the cells. Histologically, it appeared benign.

FIGURE III. Photomicrograph of the tumour. x 12.

Postoperative course.

The sequel was tragic. The patient never recovered consciousness, but remained in coma until her death 16 days after operation.

An autopsy revealed that the wound in the duodenum was healed. There were no other intestinal tumours. The brain was slightly oedematous. The liver showed a little fatty infiltration. There was no evidence of fat embolism.

DISCUSSION.

This case illustrates the difficulties in the diagnosis of these tumours. Firstly, the significance of the anaemia was not realised, especially as the melaena was not diagnosed until late in the history. Thus, also, the cause of the abdominal pain was not appreciated.

The radiological report of a filling defect in the caecum acted as an incentive to operation, even though it turned out to be quite erroneous.

The cause of death is quite unknown. The coma was thoroughly investigated, but no cause for it was ever found, not even at the autopsy.

The anaesthetic, administered by a very experienced anaesthetist, was preceded by premedication with $\frac{1}{3}$ grain of omnopon and 1/150 grain of scopolamine. The anaesthetic consisted of one gramme of intravenous penthothal plus 70 per cent. nitrous oxide and 30 per cent. oxygen, aided by 15 milligrammes of tubarine. Prostigimine was given at the conclusion of the operation, which lasted $1\frac{1}{4}$ hours. Nothing which might account for her death was noticed during the operation from the anaesthetic point of view.

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PAPILLARY CARCINOMA OF THE RENAL PELVIS.

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NEOPLASMS derived from the epithelium of the renal pelvis are uncommon and, according to Hinman (1935), comprise from 5 - 10 per cent. of the tumours of the kidney. Macalpine (1947), quotes Kutzman (1938), as setting their incidence at 6.4 per cent. Isolated examples of this condition are therefore worthy of record.

CASE REPORT.

A male patient, aged 56, complained of three attacks of painless haematuria over a period of three years. Clinical examination did not disclose any abnormality and a cystoscopic examination failed to reveal any pathological lesion in the lower urinary tract. Haematuria was not in evidence when this examination was made.

FIGURE I. A bilateral retrograde pyelogram. The right pyelogram is almost normal, but there is a filling defect between the upper and middle calyces which is bordering upon the pathological. The upper calyx is almost separated from the renal pelvis. The left pyelogram is normal.

A bilateral ascending pyelogram was obtained (Figure I), and in view of the doubtful findings shown in the radiogram the patient was instructed to report for re-examination in three months.

Ascending pyelography was performed when the patient returned for examination. At the cystoscopic examination old blood drained from the right catheter. A retrograde pyelogram was obtained
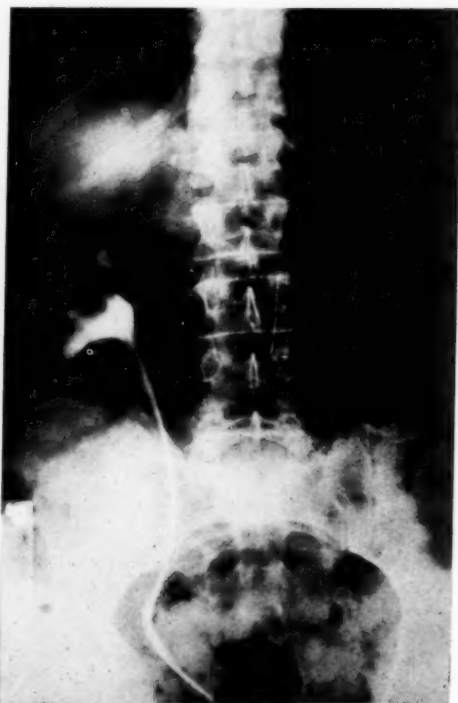

FIGURE II. A right retrograde pyelogram. There is a definite filling defect in the right renal pelvis. This has grown larger since the picture taken three months previously. The upper calyx has become completely shut off from the renal pelvis.

(Figure II), and subsequently right nephrectomy was performed. The patient's convalescence was uneventful.

Following the operation the patient has been observed at intervals. At the time of writing, 21 months after nephrectomy, there is no evidence of local recurrence of the tumour, an unusual feature in cases of squamous epitheliomata of the renal pelvis. There is also no evidence of any involvement of the residual ureter or of the bladder.

FIGURE III. The specimen. The renal pelvis is seen to be occupied by a papilliferous carcinoma which is invading the renal parenchyma.

DISCUSSION.

Epithelial neoplasms of the renal pelvis, whether histologically benign or malignant, showed a marked tendency to disseminate throughout the lower urinary tract, a tendency which is shared by tumours of similar nature occurring in the bladder. Macalpine (1947) states that, when occurring in the renal pelvis, papillomatous growths produce seedlings in the ureter or bladder in 40 - 50 per cent. of the cases, and on this account he recommends one stage nephro-ureterectomy as the ideal form of treatment. He gives instances of recurrence in the residual ureter at 1, 2, $2\frac{1}{4}$, $2\frac{1}{3}$, and $4\frac{1}{2}$ years, following simple nephrectomy. These recurrences necessitated secondary ureterectomy, and he mentions one inoperable recurrence in the residual ureter at four years, with death five years after the simple operation. Another point of view is that expressed by Harris (1947), whose opinion it is that, "provided there is no cystoscopic or ureterographic evidence of ureteric involvement, and provided that adequate watch is maintained, ureterectomy is not necessary in the treatment of cases of simple papillomata of the renal pelvis."
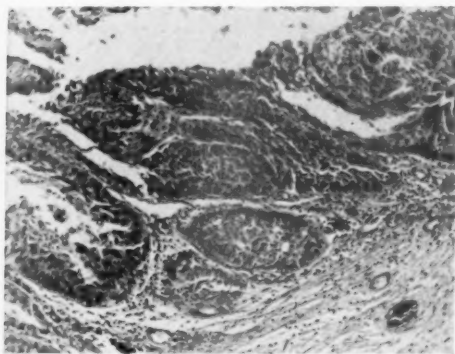

FIGURE IV. A photomicrograph of the tumour (x 100). The tumour is a squamous epithelioma. It has a papillary structure and the more deeply placed portions of the epithelium appear to be invading the tissues of the renal pelvis, although it is possible that this invasion is not very active.

Nephro-ureterectomy is an operation of such magnitude as to preclude its applicability in all cases. Simple nephrectomy, if followed by adequate postoperative supervision, combined with periodic cystoscopic and ureterographic investigations, might prove to be adequate in such cases. Macalpine's experiences would indicate that such supervision must be maintained for at least five years and particular care taken at the original operation to avoid contamination of the wound.

SUMMARY.

1. A case of papilliferous squamous carcinoma of the renal pelvis is reported.

2. The patient has been free of local recurrence and recurrence in the residual ureter and bladder for 21 months following simple nephrectomy.

3. Current opinions on the treatment of papilliferous disease of the renal pelvis are discussed.

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CARCINOMA ARISING IN A DIVERTICULUM OF THE URINARY BLADDER.

By V. S. HOWARTH

(Gordon Craig Fellow in Urology, the University of Sydney and the Royal Prince Alfred Hospital)

K RETSCHMER (1940), in a study of 236 cases of diverticulum of the bladder, found four examples of primary carcinoma arising within the diverticulum, an incidence of 1.6 per cent. Hinman (1935), quotes Judd as giving the incidence of tumour formation in a vesical diverticulum as 2.3 per cent. Madison (1948), states that the literature contains reference to 95 examples of carcinoma arising in a vesical diverticulum. Muellner (1946), points out that a pitfall is associated with the diagnosis of this condition because haematuria, which is the predominant symptom, is usually erroneously explained on the basis of associated prostatism or infections; he maintains that in most instances the carcinoma in the diverticulum can only be discovered by digital exploration when the bladder is opened, and on these grounds advises surgical exploration of all large bladder diverticula.

The following case record well illustrates the diagnostic difficulty that may be presented when this combination of pathological lesions occurs in the urinary bladder.

A male aged 63 complained of attacks of frequency and scalding micturition, accompanied by intermittent haematuria. These symptoms had been present for a period of 8 months. Between the attacks he had been quite free of any symptoms and had not noticed the passage of gravel nor had he experienced any difficulty in passing urine. He had noticed a slight loss of weight, but there were no symptoms referable to other systems.

Haematological and blood biochemical findings were within normal limits and examination of the urine disclosed it to be clear, without any abnormal constituents and sterile on culture. A plain X-ray of the kidneys, ureter and bladder did not disclose any radio-opaque calculus.

An intravenous urogram was obtained and is shown in Figure I.

A cystoscopic examination was carried out and an enlarged adenomatous prostate was found to

FIGURE I. An intravenous urogram. The renal outlines are normal in position and the kidneys show good function. The intravenous cystogram shows the faint shadow of a large vesical diverticulum springing from the left bladder wall.
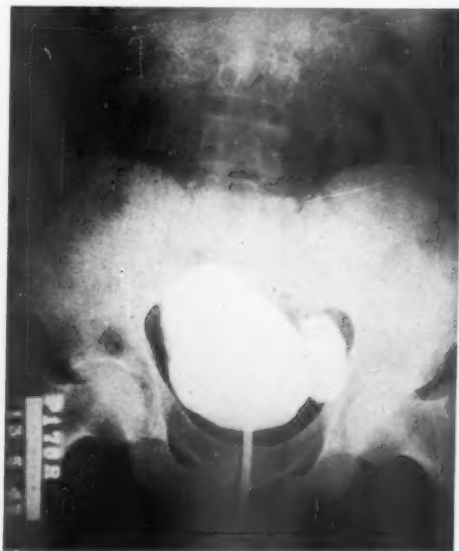

FIGURE II. An opaque cystogram. There is a large vesical diverticulum springing from the left lateral wall of the bladder. The outline of the diverticulum is quite smooth and regular.

encroach upon the vesical neck. The orifice of the large diverticulum could be seen on the left lateral wall of the bladder above the left ureteric orifice. The diverticulum is shown in the opaque cystogram (Figure II).

Suprapubic cystotomy was performed and the diverticulum, which had been disclosed by cystography and cystoscopy, was explored and its mucosa everted into the bladder and closely scrutinized. No pathological lesion could be seen in the interior of the diverticulum to account for the patient's complaint of haematuria. Suprapubic prostatectomy was then performed.

Following the operation the patient had an uneventful and quick convalescence. Examination of the tissue removed at operation disclosed that its pathological nature was benign.

FIGURE III. The specimen removed at operation. A glass rod has been inserted into the orifice of the diverticulum.

The patient was free of symptoms for three months following prostatectomy, at the end of which time he again noticed the presence of intermittent haematuria, which was at times profuse and accompanied by clots. On admission to hospital for investigation, five months after the previous operation, a cystoscopic examination disclosed a small papillomatous growth at the orifice of the vesical diverticulum. This was treated by transurethral fulguration and the patient was observed at three-monthly intervals for a period of 15 months. On each of these occasions the patient was found to have a recurrence of the papilloma at the orifice of the vesical diverticulum and it was treated by transurethral fulguration on each occasion.

FIGURE IV. The diverticulum on section. Part of the diverticulum is seen to be lined with tumour growth and the remainder by an epithelium in which no tumour growth is evident.

On reporting for routine examination 18 months after suprapubic prostatectomy had been performed, the patient stated that his urine had become thick and that he had lost about three-quarters of a stone in weight over the past six months. Examination of his urine revealed that a heavy pyuria was now present and cystoscopic examination showed that in addition to the presence of a growth at the orifice of the vesical diverticulum which now had the appearance of a "mushroom" carcinoma, a generalized cystitis had also developed.

Diverticulectomy and partial cystectomy were performed, utilizing a transvesical approach. The defect left in the bladder wall after the excision of the diverticulum and growth, was closed by interrupted sutures and without drainage of the extravesical tissues. The bladder was closed about a White's tube. The patient's convalescence was uneventful. The specimen removed at operation is shown in Figures III and IV, and its pathology is indicated in Figures V and VI.

SUMMARY.

1. An example of carcinoma arising in a diverticulum of the bladder is recorded.

2. The condition is rare and its incidence is variously estimated as occurring in 1.6 per cent. to 2.3 per cent. of all bladder diverticula.

3. Diagnosis is difficult and the haematuria which commonly occurs is usually attributed to associated prostatism or to concomitant infections.

4. Visual inspection of the interior of the diverticulum at operation did not, in the case reported, disclose the presence of the neoplasm.
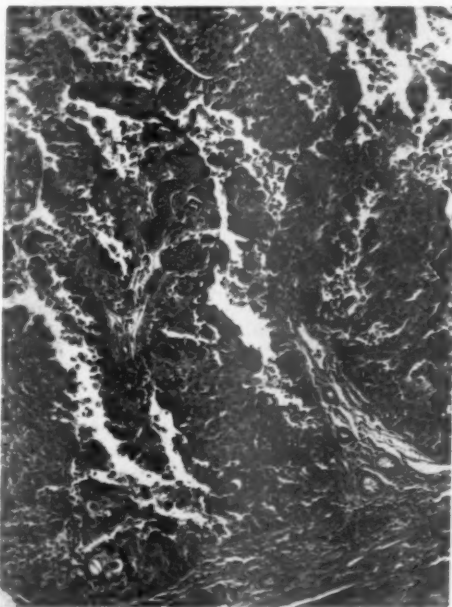
ACKNOWLEDGMENTS.

FIGURE VI. A photomicrograph of the tumour (x 100). The tumour is a carcinoma which has a somewhat papillary structure. Muscular tissue can be seen external to the tumour growth but it is being infiltrated by carcinoma cells.
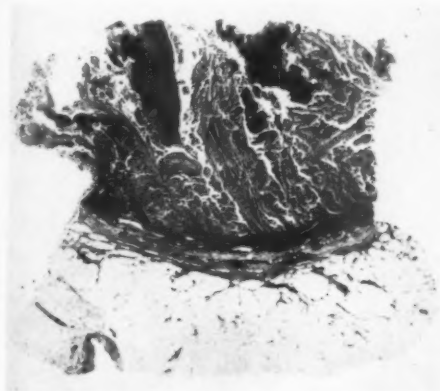

FIGURE V. A low power view of the microscopic section taken from the wall of the diverticulum and showing the perivesical fatty tissue and the lining of neoplastic epithelium.

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TWO SUGGESTIONS IN TREATING CONGENITAL DISLOCATION OF THE HIP.

By R. McKellar Hall.

Perth.

SINCE the days of Lorenz, who recognised the necessity for prolonged immobilisation after reduction, a plaster of Paris spica has been the accepted method of achieving that objective. This had many disadvantages, the most important being the necessity for frequent changes owing to soiling and softening by urine. Another was the complete immobilisation of the lower limbs, preventing physiological movement and exercise. The former was overcome in a variety of ways in different clinics. I designed a frame and sling by adapting the principle of the deck chair by splitting the canvas longi-
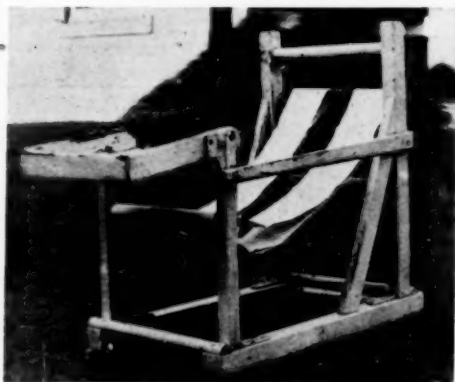

FIGURE I.

tudinally into two slings, the thigh portion of the plaster on each side resting on one of the slings, leaving the perineum free—a pan placed beneath collected the discharges, and the plaster remained dry. The child very quickly became accustomed to the position, and the back could, if necessary, be lowered to give a more recumbent attitude at night. This apparatus was a considerable advantage, for it enabled some parents to take their children home, and it put an end to the tiresome but unavoidable two or three monthly replasterings. Plasters had now to be changed only because the patients grew out of them.

One father, a carpenter, took the body off the pram and so modified it that he could place the frame on it and take it off without difficulty. Later the second disadvantage was overcome by dispensing with the body portion of the plaster altogether and uniting the leg plasters with a V-shaped iron. The idea was obtained originally from Schwartz (1945), who joined the foot pieces of the plasters with wood. This was modified by using an iron joining the thigh pieces (Figure II), because, as you can see from the illustration, it seemed neater and less cumbersome.

FIGURE II.

By doing this I inadvertently solved the problem of movement and exercise, for the first child on whom it was used stood and then walked round in her cot, balancing on the apex of the bar, and moving herself with her feet. She became very proficient in this method of progression. This idea so simplified the treatment that we now reduce the dis-

location, and, in a few days, when post-reduction pain has disappeared, send the children home to their parents, who have no nursing difficulties or splinting problems to contend with, and a long stay in hospital is avoided without detriment to the patient.

I am aware that other modifications have been introduced by many orthopaedic surgeons with the same aim in view, but the success of this method since it was first employed in October, 1945, seems to justify its publication.

REFERENCE.

SCHWARTZ, R. PLATO (1945), *J. Bone and Joint Surg.*, vol. 27, page 166.

Books Reviewed.

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By Sir JAMES HARDIE NEIL, C.B.E., D.S.O., F.R.A.C.S., F.A.C.S., and T. HARDIE NEIL, D.L.O., F.R.A.C.S. Fourth Edition. Auckland: Auckland Service Printery (Angus & Robertson, Sydney—Aust. agents), 1948. 8¼" x 5", 157 pp., 38 illustrations. Price not stated.

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medicine, pre-operative and post-operative management, pediatrics and prophylactic medicine.

In conclusion, it may be said that this volume covers without exception every aspect of therapeutics very fully, and contains much information of value in the use of drugs and other forms of therapy, and even the contents of a physician's bag. In several instances, however, in the endeavour to cover all known methods of therapy, valuable and valueless, there is a lack of really clear-cut plans of treatment.

Books Received.

THE PRINCIPLES AND PRACTICE OF RECTAL SURGERY.
By WILLIAM B. GABRIEL, M.S.(Lond.), F.R.C.S.(Eng.). Fourth Edition. London, Eng.: H. K. Lewis & Co. Ltd., 1948. 9¾" x 5¾", x plus 508 pp., 11 coloured plates, 278 illustrations (some in colour). Price: 45s. net.

TWENTY-THIRD MEETING OF THE NORTHERN SURGICAL ASSOCIATION, held in Stockholm, 26th to 28th June, 1947
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